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### Prediction Classifier for Heart Disease Using Machine Learning Approach

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ABSTRACT: Heart disease is considered as one of the major causes of death throughout the world. It cannot be easily predicted by the medical practitioners as it is a difficult task that demands expertise and higher knowledge for prediction. An automated system in medical diagnosis would enhance medical efficiency and also reduce costs. We will design a system that can efficiently discover the rules to predict the risk level of patients based on the given parameters about their health. The goal is to extract hidden patterns by applying data mining techniques, which are noteworthy to heart diseases, and to predict the presence of heart disease in patients where the presence is valued on a scale. The prediction of heart disease requires a huge size of data which is too complex and massive to process and analyze by conventional techniques. Our objective is to find out the suitable machine learning technique that is computationally efficient as well as accurate for the prediction of heart disease.

KEYWORDS: Support Vector Machine; Naive Bayes; Logistic Regression; UCI; Data cleaning; Feature Scaling; Factorization;

#### I. INTRODUCTION

Cardiovascular disease is determined to be a critical cause of death across the globe. These disease predictions require expert knowledge and huge medical amenities such that accurate results can be generated. As performing such a very critical act one has to be very conscious and predict accurate results during the diagnosis is made, this where the thought of automation comes which could help the medical practitioners to decide before the patient undergoes further treatment. An automated system in medical diagnosis can help in enhancing the efficiency of medical diagnostics and also reduce costs.

In this paper, a system is been design in such a way that discovering certain rules to predict the efficiency of risk levels of a person with given parameters of their current health directories will help in diagnostics. The aim is to detect those hidden patterns and extract them on applying some data mining techniques, which can be significant to identify the heart disease, and ease in classifying the presence of disease in patients with a scale of presence is evaluated. As the prediction requires voluminous data which is complex by its nature and it is massive in size to process and analyze by traditional techniques.

The main purpose of the system is to design a suitable and strong machine learning techniques with highly automated efficiently and predict the heart disease accurately. Heart diseases are intensely causing death all over several countries, since from a few decades. In earlier stages detection and under some clinical supervision one can reduce the loss of death. However, in all cases, the detection may or may not be accurate and respective consultant doctor is available or not since as it requires more time, expertise, and sapience in the field. An abnormality found in normal blood flow in a human heart leads to causes several types of heart disease which are referred to be cardiovascular diseases (CVD).

#### II. RELATED WORK

Heart disease is considered as one of the major causes of death throughout the world. It cannot be easily predicted by the medical practitioners as it is a difficult task that demands expertise and higher knowledge for prediction. An automated system in medical diagnosis would enhance medical efficiency and also reduce costs. We will design a system that can efficiently discover the rules to predict the risk level of patients based on the given parameters about their health.

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#### A prior case study of natural language processing on different domain

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Article Info	ABSTRACT
Article history: Received Jun 22, 2018 Revised Mar 14, 2020 Accepted Mar 24, 2020	In the present state of digital world, computer machine do not understand the human's ordinary language. This is the great barrier between humans and digital systems. Hence, researchers found an advanced technology that provides information to the users from the digital machine. However, natural language processing (i.e. NLP) is a branch of AI that has significant implication on the ways that computer machine and humans can interact.
<i>Keywords:</i> Artificial intelligence Human language Natural language processing Text mining	NLP has become an essential technology in bridging the communication gap between humans and digital data. Thus, this study provides the necessity of the NLP in the current computing world along with different approaches and their applications. It also, highlights the key challenges in the development of new NLP model. Copyright © 2020Institute of Advanced Engineering and Science. All rights reserved.

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#### 1. INTRODUCTION

Naturally, human language is complex and to understand this language, a system must also know about corresponding grammatical rules, meaning and context, along with slang and acronyms utilized in the language. Natural language processing (NLP) is the mechanism which supports the computer machine by simulating the human capability to understand the language. NLP is the significant area in which by analyzing data, the system can extract the information from the contexts and provides the input information in several ways. Basically, it is a relationship among human language and computer machine, i.e. NLP operates machine understanding, analysis, generation or manipulation of natural language. However, natural language refers to analysis of text as well as audible speech, whereas machine captures or recognizes the meaning of input words in terms of structured output. NLP is basic element of artificial intelligence (AI). The initial goal of NLP is to provide such type of interaction so that nonprogrammers can produce useful information from computer machine. Such type of communication was popularized in the movie "A Space odyssey" in 1968. The NLP also has the ability to make insights from information contained in mails, video files and other unstructured content [1-4].

M. Maxson, said that, in future most of the useful information will be in unstructured form. The future BigData will be the combination of both structured and unstructured data and utilizing inherent data patterns that integrate from data itself and not from police imposed on data-sets by humans. It has been frequently noted that NLP predominantly is utilized to analyze, retrieve and summarize the pertinent data from large sets of data available. An exploration of NLP concept was introduced in 1950 when Turing-test on computer machine and intelligence was introduced [5]. It was able to exhibit intelligent behavior similar to, or non-differentiable from, that of a person. NLP need a combination of verbal and computational

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# Evaluation of structural, optical, and dielectric characterization of adipic acid crystals grown in aqueous solution of ∟-alanine

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#### ABSTRACT

In this paper, adipic acid crystals were grown using slow evaporation method in aqueous solution of L-alanine at room temperature. X-ray diffraction investigation shows that the crystal belongs to P21/n space group. EDAX study confirms the occurrence of elements in the crystal. The crystal is thermally stable up to 124 °C. Further, the grown crystals were exposed to Co-60 gamma radiations with different doses of 1 Mrad, 3 Mrad, and 5 Mrad at normal room temperature. After gamma irradiation, a small change in the intensity and a slight shift in the Powder X-Ray Diffraction (PXRD) peaks were seen. UV–visible analysis reveals an increase in reflectance after gamma irradiation. Increase in dielectric constant, dielectric loss, and AC conductivity was observed by dielectric studies. Second Harmonic Generation (SHG) efficiency of the crystal is 0.42 times that of the standard Potassium Dihydrogen Phosphate (KDP) crystal and is increased moderately up to the gamma irradiation dosage of 3 Mrad.

#### 1 Introduction

Modern world depends on the development of science in many areas. The growth of nonlinear optical crystals has a considerable impact on optical communication, laser technology, and digital data storage technology [1]. Organic crystals are chemically pure and exhibit good optical nonlinearity and low scattering densities than inorganic crystals which have elevated melting point and high mechanical properties. The nonlinear response of the organic crystal is due to the asymmetric distribution of charge in the  $\pi$ electron system. Amino acids show nonlinear optical (NLO) activity as all amino acids except glycine have chiral carbon atom, a proton-donating carboxyl group with a proton-receiving amino group, and crystallize in centrosymmetric space groups [2].

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#### REVIEW

#### Novel Foam Adsorbents in Dyes and Heavy Metals Removal: A Review

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The present review comprises various novel foam adsorbents with unique adsorption performance in process of removal of dyes and heavy metals. Water pollution because of toxic dyes and heavy metals and its ill-effect on the ecosystem is of great concern to researchers, as it affects the living creatures on the planet. Novel foam adsorbents from carbon foam, chitosan foam, metal foam and polymer foam were developed as efficient materials with good chelating ability to adsorb dyes and heavy metals. Novel carbon foam adsorbents were reported to have superior adsorption capacity in removal of dyes and heavy metals. This review aims to look at various novel foam adsorbents used in adsorbents used in adsorption studies and their potential in dyes and heavy metals removal. This work provides a worthy challenge and the future possibility for designing novel foam materials for various applications.

Keywords: Novel foam adsorbents, Dyes, Heavy metals, Adsorption, Adsorption capacity.

#### **INTRODUCTION**

Dyes and heavy metals contamination in water are associated with danger in human health due to their toxic, carcinogenic and mutagenic effects [1]. The accumulation of dyes and heavy metals in water leads to bioaccumulation in aquatic biota and pose serious health risks that significantly affect the biodiversity in the environment. Dyes and heavy metals used during the industrial processing find their way in mixing with surface water through effluents from textiles, metal plating, fertilizers, pharmaceutical, mineral processing industries [2]. Due to the toxic effects of industrial wastewater, there is a need to treat the dyes and heavy metals contaminated water to preserve the environment. A wide variety of treatment methodologies were in current use with different degree of success, such as chemical precipitations [3], photocatalysis [4], electrochemical method [5], reverse osmosis [6], adsorption [7,8], etc. Of all the treatment methods, adsorption has gained significant interest in testing novel materials by researchers due to its simplicity,

the highest efficiency in the removal of pollutants. In literature, novel foam adsorbents were prepared and used as efficient adsorbents in adsorption studies. Moreover, some foam adsorbents proved to be promising materials in dyes and heavy metals removal and this have created interest to various researchers and scientists to develop novel foam adsorbents with superior adsorption capacity [9]. The development of novel foam adsorbents and their improved efficiency in removal of dyes and heavy metals in contaminated water and this has gained significant interest among researchers.

**Toxic dyes and heavy metals:** Dyes are needed for industrial process to colour variety of products. The dye contaminated water leads to various health issues that affect kidney, liver, brain, central nervous system and skin problems [10]. The existence of dyes in surface water imparts colour even at very low concentrations and resists the entry of light and harms the aquatic systems. The non-biodegradable dyes from textile, paper and pulp, paint and tannery industries if improperly managed significantly alters the quality of soil and water and

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#### Protocol for Medicine and Technology for COVID-19 - A Mini Review

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#### ABSTRACT

The global Corona virus pandemic has brought in a lot of issues, concerns and challenges to humanity and the ecosystem. There is a medical emergency to take up strict measures to slow or stop the spread of this virulent pathogen SARS-CoV-2, the virus that causes COVID-19 which is a new variant indicating its origin to the Wuhan city of China. People across nations have been experiencing all the economic and psychological consequences due to this outbreak, and the whole world has joined hands in eradicating this deadly disease. A lot of awareness schemes are being undertaken by many countries and organizations, to not only control the infection but also to revive normalcy. This article provides valuable information about the cause, symptoms, diagnosis, treatment protocols, counseling support systems, innovation strategies, etc., all to ensure that we overcome this crisis and spring back to our healthy routines.

Keywords: COVID-19, SARS-CoV-2, WHO, Vaccine, Treatment, Technology.

#### **1. Introduction**

The new corona virus disease has got unusual spreading properties and is causing high rate of death. All over the world, the governments of different countries started issuing public laws such as social distancing, isolation, self-quarantine, lock down etc. [1]. A psychological part of SARS-COV-2 infection is dread, which is characterized as a horrendous passionate express that is set off by the view of compromising upgrades. What astonished is, the pandemic now, (is not from loans, or finance) but from a virus; it is important to note that, medical community that recovery will be only possible when effective vaccine is offered [2].

#### 1.1 Symptoms of human infection

Symptoms of human infection by COVID-19 at the prodromal phase such as Malaise, dry cough and fever are not specific for COVID-19 [3]. It is surprising to see that, the human upper respiratory track is very much far from this frequent effect of the virus. From several reports published all over the world, the most common symptoms for a person who is infected with COVID-19 are lymphopenia and trilateral ground-glass opacity, along with certain chest issues [4].

#### 1.2 A brief of SARS-COV-2

There was an ally that the origin of SARS-COV-2 was bats [5]. A dominant part of the general public has concurred that, keeping up well-being and cleanliness, covering the nose

#### *In vitro* antibacterial, antioxidant and cytotoxicity response of CuO nanoparticles prepared by lemon juice and citric acid fueled solution combustion synthesis

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#### Abstract:

This research work presents the synthesis, characterization, evaluation of the antimicrobial and anticancer response of CuO nanoparticles prepared by solution combustion method using citric acid and lemon juice as fuels. The X-ray diffractograms of both the samples revealed the monoclinic structure of CuO with the standard JCPDS [45-0937]. Surface morphology of the samples was studied by scanning electron microscopy and transmission electron microscopy. Antimicrobial studies revealed the bactericidal and fungal activity of CuO nanoparticles. Furthermore, to better understand the parameters that affect the interactions between our CuO and mammalian cells, and thus their biocompatibility, we have examined the impact of cell culture conditions as well as of material properties on cytotoxicity by blood haemolysis, The results showed the biocompatibility of CuO NPs. 2, 2-diphenyl-1-picrylhydrazyl hydrate assay studies indicated the antioxidant activity of the samples at varied concentrations. Cytotoxicity studies revealed the anticancer activity of CuO NPs against PC-3, HCT116, A549 and MDA-MB-231 cancer cells.

Keywords: CuO nanoparticles; Bio fuels; Antimicrobial; Antioxidant; Cytotoxicity.

#### 1. Introduction

In recent years, nanostructures of transition metal oxides have gained more attention from material scientists and engineers because of their different properties associated with bulk materials (counterparts), which in effect offer promising applications in various fields of technology. Copper oxide has been categorized in the transition metal oxide group and having a narrow band gap of 1.2 eV and is a p-type semiconductor type. It has a monoclinical structure and several unique features including super conductivity, photovoltaic effects, and high stabilization including antibacterial function. Owing to these protected features, CuO can also be used in technical fields such as active catalyst [1], gas sensor [2], highly efficient thermal conductive materials [3], magnetic recording media [3], with very strong selectivity or solar cell applications [4].

Solution Combustion Synthesis (SCS) is an exciting process involving dissemination of self-sufficient exothermic responses through aqueous or sol-gel media. The method permits the synthesis of a number of nano scale materials as well as oxides, alloys of metals then sulphides [5, 6]. Recently it is the most commonly utilized method for processing a variability of oxide ingredients now together Nano also micron dimensions system by chemists, physicists, and material scientists global. Strength of this method



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Evaluation of Antimicrobial, Antioxidant, and Cytotoxicity Activities of CuO Nanopellets Synthesized by Surfactant-Free Hydrothermal Method

#### Reference

H. M. Sathyananda, P. A. Prashanth, G. K. Prashanth, B. M. Nagabhushana, G. M. Krishnaiah, H. G. Nagendra, M. S. Dileep, S. Ananda, and S. R. Boselin Prabhu, "Evaluation of Antimicrobial, Antioxidant, and Cytotoxicity Activities of CuO Nanopellets Synthesized by Surfactant-Free Hydrothermal Method," *Journal of Testing and Evaluation* https://doi.org/ 10.1520/JTE20200538

#### ABSTRACT

Copper oxide nanopellets (CONPs) were produced by hydrothermal strategy. The particles were characterized by distinctive techniques. The synthesized particles were found to have pellet morphology with nonuniform thickness and varying sizes extending between 200 and 550 nm. Studies revealed their microbial nature against both Gram-positive and Gramnegative microscopic organisms, specifically *Staphylococcus aureus*, *Bacillus subtilis*, *Pseudomonas fluorescens*, and *Escherichia coli* and a plant parasitic pathogen *Fusarium oxysporum*. Studies demonstrated the antioxidant ability of CONPs at higher concentrations. In this paper, cytotoxicity was measured by blood hemolysis. Anticancer activity of CONPs tested against PC-3, HCT116, A549 and MDA-MB-231 cell lines after 24 hours exhibited IC<sub>50</sub> values of 72.27, 144.2, 173.9, and 13.07  $\mu$ g/mL, respectively. Although these phenomena have been determined in other reports, this report is indeed of significance for CONPs within the particle length of 200–550 nm.

#### Keywords

copper oxide nanopellets, hydrothermal, antimicrobial, antioxidant, cytotoxicity

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#### Introduction

Copper oxide (CuO) has been a hot topic in a number of evaluations on metal oxide nanoparticles (NPs), much inspired by its attention-grabbing unconventional properties. Being a semiconductor with monoclinic structure, CuO has drawn considerable interest in the field of nanotechnology. CuO NPs with a narrow band gap of ~1.7 eV has been found to have photovoltaic and electrical conduction properties. CuO NPs have numerous mechanical and commercial applications, such as in semiconductors, digital chips, heat change nanofluids, catalysts, solar cells, and lithium batteries. They could also aid in the synthesis of fullerenes and be used in numerous materials like explosives and propellants. They are already utilized as additive substances in inks, plastics, lubricants, metallic coatings, and also in various skin products. They are observed to suppress the development of microorganisms and exert antiviral properties. Subsequently, CuO NPs are utilized in materials like wound dressings and socks to permit them biocidal action. Much appreciated because of their higher mechanical properties, CuO NPs are being made on an outsized scale and manufacturers are expecting to increase production over a long period.

A few methods are used to produce CuO NPs, such as sol-gel,<sup>1</sup> electrochemical,<sup>2</sup> electrical discharge,<sup>3</sup> microwave-assisted technique,<sup>4</sup> sonochemical,<sup>5</sup> co-precipitation,<sup>6</sup> solution combustion strategies,<sup>7</sup> ultrasonic blending and self-assembly strategies,<sup>8</sup> and hydrothermal technique within the presence of polyethylene glycol.<sup>9</sup> Among the various methods of nanomaterials synthesis, the hydrothermal method is considered to be the most dependable route for the production of NPs with consistent size because of its ability to control the particle size by controlling synthesis conditions such as temperature, pressure, time, etc.<sup>10</sup>

The hydrothermal synthesis of NPs cam be supplemented in a few ways; with powders, with which nanometer sizes are normally obtained, the reaction can be carried out under moderate conditions, and powders with absolutely various morphologies are consistently delivered by changing the reaction conditions. Thus, the as-obtained NPs are supposed to possess various properties derived from the bulk materials.<sup>11,12</sup> The hydrothermal approach has been used to synthesize various materials, including chalcopyrite copper iron sulfide (CuFeS<sub>2</sub>),<sup>13</sup> bismuth telluride (Bi<sub>2</sub>Te<sub>3</sub>),<sup>14</sup> chitosan/CuO nanocomposite,<sup>15</sup> nanoceria,<sup>16</sup> and superabsorbent polymer (SAP-11)<sup>17</sup> molecular sieve. Leaching of heavy metals from municipal solid waste incineration fly ash by hydrothermal treatment has also been reported.<sup>18</sup> With this background of direction toward future research, this effort reports the synthesis and evaluation of pellet-shaped CuO NPs by direct, low-temperature hydrothermal strategy. The synthesized CuO nanopellets (CONPs) were characterized by distinctive strategies. The sample was evaluated for its antimicrobial activity using the well diffusion technique, in vitro antioxidant ability by 2, 2-diphenyl-1-picrylhydrazyl hydrate (DPPH) assay, cytotoxicity by blood hemolysis, and anticancer response by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay.

The rest of the paper has been summarized as follows. The experimental details including material synthesis and characterization of CONPs, assessment of antimicrobial activity, evaluation of scavenging activity, cytotoxicity by hemolysis assay, and evaluation of anticancer activity have been discussed in the Experimental Details section. The results and discussions over crystal structure, Fourier transform infrared spectroscopy (FTIR) analysis, product formation mechanism, morphology, surface area to volume of CONPs, antimicrobial activity, scavenging response, hemolysis, and anticancer activity **SOCIETY OF JAPAN** 

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### Effect of doping (with cobalt or nickel) and UV exposure on the antibacterial, anticancer, and ROS generation activities of zinc oxide nanoparticles

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#### ABSTRACT

We describe the synthesis, structural and morphological characteristics of cobalt and nickel doped zinc oxide nanoparticles (ZnO NPs) by solution combustion technique by utilizing lemon juice as bio-fuel. Structural parameters were confirmed by the X-ray Rietveld refinement method, all the compounds were crystallized in the wurtzite hexagonal structure with space group P63mc (No. 186). Field emission scanning electron microscopy coupled with energy dispersive X-ray elemental mapping results revealed agglomerated spherical shaped particles and dopant ions were homogeneously distributed. Antibacterial, anticancer, and reactive oxygen species (ROS) generation activities were studied on undoped ZnO-, Co-, and Ni-doped ZnO nanoparticles upon un-exposed/exposed to ultraviolet radiations at 300 nm for 1 h. Antibacterial studies were performed against Salmonella enterica and Clostridium perfringens. Anticancer activity was tested on HeLa and MCF-7 cell lines. Generation of ROS was studied in J744 mouse macrophage cells. Doping of cobalt or nickel in the ZnO lattice enhanced antibacterial, anticancer, and oxidative response generation activities compared to undoped ZnO NPs. These activities were further improved upon exposure to ultraviolet radiations. Together, data indicate a direct activity of ZnO NPs against bacteria, cancer cells and simultaneously boosting host's immunity via inducing activation of immune cells (mouse macrophage cells).

#### **ARTICLE HISTORY**

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#### **KEYWORDS**

Co/Ni doped ZnO; UV exposure; ROS measurement; flow cytometer; antimicrobial; cytotoxicity

#### 1. Introduction

The use of ZnO nanoparticles (NPs) for anticancer and antibacterial treatments has been previously well demonstrated by many researchers. ZnO NPs have received considerable attention in recent days for their use as anti-virals [1-3]. Various shapes and sizes were tried and some form of difference was found. However, ZnO being a semiconductor material, we wanted to understand how we could use this property to our advantage. It was found from the literature which showed that ZnO tetrapods were better able to adsorb buffer onto their surface when they were exposed to UV rather than when unexposed [4]. We wanted to understand how we could further increase the efficacy of these particles. Literature survey indicated that the best way to enhance these properties was by doping the particles with other transition metal ions which could enhance the UV absorption property.

Hence, in the present work, Cobalt (Co) and Nickel (Ni) have been chosen as model transition metal ions to dope into ZnO. There are only few reports on the antimicrobial and anticancer activities of Co and Ni-doped ZnO NPs.

Recently, many complexes and nanomaterials of Co (II) showing antimicrobial activity have been reported [5]. Most of those studies were primarily focused on optical, electrical, and magnetic properties of Co-doped ZnO NPs [6]. Also few attempts to consider the antimicrobial properties of Co-doped ZnO NPs have been made in the past. Co-doped ZnO NPs show higher activity as an antimicrobial agent against Salmonella typhi, Staphylococcus aureus, Bacillus cereus, Escherichia coli, Pseudomonas aeruginosa (P. aeruginosa), and Candida albicans (C. albicans) compared to undoped ZnO NPs [7]. Ni-doped ZnO NPs demonstrated stronger antibacterial activity against P. aeruginosa and Bacillus subtilis than the undoped ZnO NPs [8]. Cytotoxcity of Ni-doped ZnO NPs against HEK293T and HEp2 cell lines has also been reported [9]. Experimental results have also indicated that the assimilation of Ni into the ZnO matrix has a beneficial effect on the antimicrobial activity of ZnO NPs, and enhances the ability of the ZnO NPs to kill the fungi C. albicans [9].

Solution combustion synthesis (SCS) is an exciting technique, which involves propagation of self-

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Supplemental data for this article can be accessed here.

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## Effect of vitamin-C on structural, thermal, and optical properties of lithium sulfate monohydrate crystal

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#### ABSTRACT

A single crystal of vitamin-C-doped lithium sulfate (VCLSM) was grown at room temperature from aqueous solution by slow evaporation method. The asgrown crystals were found to be transparent and yellow in color. Powder X-ray diffractogram of the pure and doped crystals was recorded and various planes were identified for their corresponding reflections. The X-ray diffraction (XRD) analysis validated the crystalline nature of the samples. Single crystal X-ray diffraction study revealed the structure of the crystals and also revealed their monoclinic crystal system with space group P2<sub>1</sub>. The vibrational modes of different functional groups present in the compound were analyzed using Fourier transform infrared (FTIR) spectral analysis. Thermal characteristics study of the crystal was carried out by thermogravimetric analysis (TGA) and differential thermal analysis (DTA) techniques, which clearly showed that the materials have high thermal stability even after doping. Optical transmittance spectrum using UV-Vis-NIR spectrometer showed that the grown crystal is highly transparent in the whole visible and Infrared (IR) region. Second-harmonic generation (SHG) property was confirmed for both pure and doped crystals by Kurtz's powder test using Nd:YAG Laser.

#### 1 Introduction

Recent research works on crystal growth paid more attention towards the growth of sulfate crystals because of their ferroelectric, piezoelectric, and pyroelectric behaviors [1]. These materials also find applications in the fabrication of nonlinear optical (NLO) devices. For usage in different applications, the materials should have nonlinear frequency conversion, fast optical response time, wide phase matching angle, high laser damage threshold, and high mechanical strength [2].

Lithium sulfate monohydrate crystal crystallizes in monoclinic crystal structure. It was proved to be a

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### *In vitro* antibacterial and anticancer response of MgO nanoparticles prepared by solution combustion synthesis

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#### Abstract:

In the present work, solution combustion synthesis of MgO using lemon juice and citric acid as fuels has been carried out. A comparative analysis of the obtained samples has been conducted to understand the strategic advantages of using lemon juice over citric acid as the combustion fuel for the synthesis of MgO nanoparticles. Antibacterial studies were carried out against *Escherichia coli* and *Staphylococcus aureus* by well diffusion method. Minimum inhibitory concentration was determined by micro broth dilution technique. Anticancer activity of MgO NPs was tested against MDA MB-231 and HeLa cell lines by 3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide assay. Haemolysis assay was performed to evaluate the biocompatibility of MgO NPs.

Keywords: MgO; SCS; Antibacterial; MTT assay; Blood haemolysis

#### 1. Introduction

Inorganic basic metal oxides are being increasingly used for antimicrobial applications due to their remarkable novel properties such as long shelf life, safety and stability under high temperature treatments [1 Among the inorganic metal oxides such as MgO, ZnO, CuO, TiO<sub>2</sub> etc are of particular inertest due to their unique properties. MgO NPs have attracted the attention of many researchers because of their wide range applications in catalysis, catalyst supports, toxic waste remediation, refractory materials, super conductors, lithium-ion batteries, and anti bacterial agents [2], etc. MgO is also an inorganic antimicrobial agent which is better and much more durable compared to many other anti-microbial agents as well as their anti-microbial consequences investigated for applications along with detoxification and bone restoration, cancer treatment including such nano-cryosurgery and hyperthermia [3].

Self-propagating high temperature solution combustion synthesis (SCS) is a simple yet reliable technique for the preparation of nanoparticles (NPs). Conventionally, organic compounds such as citric acid, urea, glycine have been used as fuels for this preparation process [4-7]. Recently, the use of naturally available organic materials as fuels has seen upswing owing to the innovative, cheaper and environmentally neutral implications as opposed to their conventional (chemical) counterparts. Furthermore, naturally extracted entities serve as both reducing and stabilizing agents during the synthesis of NPs [8]. Among various extracts, phytochemicals are emerging as a useful natural resource for the synthesis of metal/metal oxide

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#### EVALUATION OF QUALITY OF GROUND WATER DUE TO TRACE ELEMENTS IN THE PROXIMITY OF RIVER NOYYAL, TIRUPPUR, SOUTH INDIA

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#### ABSTRACT

In this present investigation, the level of penetration of trace elements in and around the Noyyal river water was carried out. Trace metal concentrations of copper, cadmium, iron, lead, zinc, manganese and cobalt of groundwater samples of the study areawere determined using Atomic Absorption Spectrometry during different periods of pre-monsoon and post-monsoon of the year 2018 and 2019. The percolation of the polluted water from river Noyyal is found to be higher in the southern part when compared to northern part which may be attributed to the slope and differential soil characteristics. Spatial distribution map of most of the trace metals in the groundwater of the study area was found to be well within the permissible limit for irrigation.

KEY WORDS : Ground water, Trace elements, River Noyyal, Water quality.

#### INTRODUCTION

Metals are non-biodegradable and accumulative in nature. Elevated emissions and their deposition over time can lead to anomalous enrichment, causing metal contamination of the surface environment (Xiao *et al.*, 2018; Fikret *et al.*, 2020; Xu *et al.*, 2020). The prolonged presence of contaminants in the urban environment particularly in urban soils, and their close proximity to the human population can significantly amplify the exposure of the urban population to metals through inhalation, ingestion,

ify the exposure of the urban migration of pollutan s through inhalation, ingestion, through urban runof

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and dermal contact (Malakar *et al.*, 2019; Tsering *et al.*, 2019). A human health concern is usually associated with excessive exposures to metals that cause toxic effects to biological organisms, referred to as trace metals of environmental concern (Tudi *et al.*, 2020; Kelly *et al.*, 2020). These trace metals may include non-essential ones, such as Cd and Pb that can be toxic even at trace levels, and other indirect consequences of trace metal contamination of the urban environment include the subsequent migration of pollutants to receiving bodies of water through urban runoff, resulting in the trace metal

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#### TREATMENT OF POTABLE WATER SAMPLES USING ECO-FRIENDLY PHYLLANTHUS EMBLICA – A SOLUTION FOR WATER POLLUTION

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#### ABSTRACT

Water is an essential constituent for the existence of any life form, is also a basic factor for the functioning of human physiology. Unavailability of good quality drinking water is wide spread and this has serious health implications. Water pollution is any physical or chemical change in water that can adversely affect organisms as well as the quality of water. It is a global problem, affecting both the industrialized and the developing nations. The problems of water pollution in the rich and the poor nations are different in various aspects. In this paper, the potable water samples were collected in and around typical distillery industry from Puliyamarathadi, Sangaramoorthy Patti, Muthalakam Patti, Varatharajan Puram, Kullapuram, Cement Road, Villapuram, Pottal Patti, Karisal Kulam, and Palrangapuram in Madurai district. Hence, the present study is mainly aimed to remove the TDS, water hardness and chloride from potable water using natural coagulants. The main objective of this research work is to collect and analyze the physicochemical characteristics of the potable water samples, to assess the microbial population present in the samples, to remove the impurities from contaminated water samples using natural coagulants such as Strychnos potatorum L seeds and Phyllanthus emblica wood, to find the phytocompounds present in the coagulants using GC-MS technique, to assess the antimicrobial activity of natural coagulants, and to identify the coagulant protein present in the plant material.

**KEY WORDS :** Drinking water, Water Pollution, Natural coagulants, Microbial population, Water samples

#### INTRODUCTION

The chief sources of water supply vary from ground water (springs, shallow wells and from deep well) to surface water (streams, rivers, ponds, pools). Water pollution is causing deterioration of water quality. It is a global problem, affecting both the industrialized and the developing nations. The water pollution problems in the rich and the poor nations, however, are quite different in many aspects. Drinking water samples (Packialakshmi *et al.*, 2013) were collected from ten different water stations around a sugar industry situated in Madurai district. Physicochemical characteristics of the drinking water samples were analyzed by following standard APHA protocol. The results were compared with BIS drinking water standard. The drinking water samples were collected from S1, S3, S8, S9 and S10 area contain higher concentration of dissolved solids, hardness and chloride.

In this study, plant based materials such as *Phyllanthus emblica* wood, and *Strychnos potatorum* L seed powder were used to remove the impurities from the water samples. It was observed that the

#### **ORIGINAL ARTICLE**



## Evaluation of antimycobacterial, antioxidant, and anticancer activities of CuO nanoparticles through cobalt doping

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#### Abstract

Here, we report the synthesis of cobalt-doped copper oxide nanoparticles (CuO–NPs) via combustion strategy with lime juice as a reductant at relatively low temperature of 600 °C and at shorter duration of 3 h. Powder X-ray diffraction (XRD) results revealed that, every compound was in monoclinic structure with space group  $C_{12}/C_1$  (No. 15) and average particle size were found to be 18–21 nm. These NPs were used to evaluate the antimycobacterial activity against "*Mycobacterium tuberculosis H37Rv ATCC 27294*", "*Mycobacterium abscessus ATCC 19977*", "*Mycobacterium fortuitum ATCC 6841*", "*Mycobacterium chelonae ATCC 35752*" and anticancer activity on *MDA-MB-231*. Antioxidant activity was evaluated by DPPH method. The results showed that, doping CuO with cobalt improved the antimycobacterial, anticancer and scavenging activities of CuO–NPs.

Keywords CuO-NPs · Cobalt doping · Antimycobacterial · Anticarcinogenic · Antioxidant

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#### Introduction

Copper oxide (CuO) with a band gap of 1.6–2.2 eV is a highly promising material since it finds applicable in numerous fields (Kadiyala et al. 2012). It was revealed by many researchers that CuO–NPs exhibit anticancer activity against various cancer cell lines (Sathyananda et al. 2020), antimicrobial activity against several bacterial strains (Sathyananda et al. 2020; Ahamed et al. 2014) and also possess antioxidant activity (Sathyananda et al. 2020). Doping of transition metal ions introduces intensified properties in CuO (Chavan 2018). Studies have also shown that cobalt doping led to stable and efficient CuO NPs as catalyst for reduction reaction (Sharma et al. 2017).

Baturay et al. (2016) reported the electrical and optical properties of CuO thin films through nickel doping in their research. Manganese doped CuO NPs have been studied by Singh et al. (2020) for their morphological, optical, magnetic, photocatalytic properties and solar cell efficiency. An enhanced PVA/PEG cross-linked membrane that was loaded with silica nanoparticles have been formed and its characterization was studied by Dilshad et al. (2021) using cutting-edge analytical methods, and corresponding homogeneous dispersal of silica NPs over the membrane was also analyzed. Zinc-doped CuO has been studied by Goyal et al.





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### Morphometric Study of Bangalore Metropolitan City, Karnataka, India

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#### Abstract

Bangalore in earlier days was very well known as the City of Lakes. Kempegowda, the founder of Bangalore, who had broad vision, established several tanks and lakes to impound runoff water, so that the water could be utilized for better purposes and also enhanced the beauty of the city. According to several reports there were around 280 tanks to meet the water demand. But today the figure has declined to about 81, of which 34 are recognized as live lakes. This number denote a reduction of water bodies as high as 35%, while in terms of water spread area it shows a decrease of 8.6% In this context a systematic morphometric analysis has been carried out and the results are presented

Keywords: Morphometric analysis, Urbanization, Rainfall, Climate, Drainage, DEM.

#### 1. Introduction

in Bangalore dates back to the later part of the 16th century, when the founder of Bangalore, Kempegowda built the Ulsoor tank covering an area of 125 acres. Most of the lakes and tanks were manmade for the purpose of drinking water, irrigation and fishing needs and they have also favourably influenced the micro-climate of the city. The lake waters have also served as "Dhobi Ghats" or places where washer-men have traditionally used them as a means of livelihood for washing clothes and drying them. The lakes have also served to replenish ground water resources in the vicinity, which are tapped through wells for drinking water. The first instance of contamination of Ulsoor tank by sewage was reported way back in 1883 after which

the use of lake water for the purpose of public consumption was prohibited. Records show that till 1960 there were 280 water bodies in Bangalore city. Today the figures have declined to about 81 of which, 34 are recognized as live lakes. These figures denote a reduction of water bodies as high as 35%, while in terms of water spread area it shows a decrease of 8.6%-In the 1970s the scheme to pump water from the Cauvery River from 100 kilometres away was begun. The water needed to be raised up by 500 meters. The water demand in 2001 was 750 million litres per day. Bangalore is also the technological capital of India. Hence, it attracts people from various parts of the country. This has caused many problems like increase of population and water demand.

Morphometric analysis has been carried out to understand the hydro-geological conditions of the watershed. Remote sensing and Geographic information system were used for the assessment of linear, aerial and relief of the study area (Horton 1932, 1945; Langbein 1947; Miller 1953; Narayanaswamy et al. 2014, 2017; Shivanna et al. 2017, 2018; Shivanna and Vyshnavi 2019; Schumm 1956, Strahler 1952, 1957). Ouantitative morphometric analysis of any area reflects its hydrological behavior and is therefore useful in evaluating hydro-geological responses of the area. Bangalore metropolitan city has been studied to quantify the morphometric characteristics that will reveal its geographic behavior. The study area exhibits the dendritic drainage pattern that indicated moderate to nil flood intensity. In order to know and asses the quantity of water available for utilization a systematic hydro-geological study is essential. In this



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### Assessment of Water Quality and Eutrophication Status of UlsoorLake, Bangalore, Karnataka, India

2

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#### Abstract

Ulsoor Lake is situated at a location surrounded by large number of residential dwellings and commercial areas. The lake water is not used as a source for water supply but the demand to do so is easily foreseen. In the present study water samples were collected at the sewage inlets before the bund as well as across the length of the lake to check the quality and eutrophication status. The region near the sewage inlets is found to be hyper eutrophic in nature with substantial amount of algal bloom and other solid wastes While the water of the lake is found to be mesotrophic in nature.

Key words: Eutrophication status, Trophic status index, Physico-chemical parameters.

#### **1. Introduction**

Water is the most common liquid on our planet, vital to all life forms. It is the dispersion medium for all biochemical reactions of the living process and takes part in many of these reactions. In spite of the chemical simplicity of the water molecule, its physical properties are quite remarkable. Water is the most essential requisites that nature has provided to sustain life on earth. Sources of water can be broadly classified as; in to: Surface water bodies such as oceans, rivers, ponds and lakes, streams; sub-surface water bodies such as ground water and soil moisture and atmospheric water. Lake is an inland surface water body and it can be defined as natural large depression formed within the surface of the earth that is filled with water. Lakes are a habitat for an immense variety of plants and animals. These plants and animals are linked together in a complicated system of interdependence and if one part is

disturbed, the whole system is upset. This system works as follows: the plants use sunlight, nutrients absorbed from the ground and water, and gases (carbon dioxide and oxygen), to grow. The animals eat the plants, which may then be eaten by other animals, then bacteria decomposes the dead plants and animals back into simpler compounds that can then be used as nutrients by living things such as plants. This constitutes the food web of a lake. All these processes -require oxygen in order to take place (Mishra and Yadav 1978). Decomposition is vital to the lakes because without it the lakes would fill up with dead plant and animal material. A lake represents lentic (standing water) ecosystems and they vary considerably in physical, chemical and biological characteristics. All these characteristics depends on many factors like how it was formed, size and shape of the lake basin, topography, regional climate, local biological communities and various human activities. The rapid pace of industrialization, agriculture development and increase in human population, has posed a serious threat to water quality of lakes and impoundments. The lake becomes nutrient rich; this promotes growth of algae and other aquatic plants, increasing the productivity of lakes and thereby leading to eutrophication. Due to this the earth surface is rapidly losing natural water bodies and it is of grave concern to our environment. A lake's productivity level may be determined by measuring the amount of algal growth that is supported by available nutrients. This productivity level of a lake is thus, a reflective of the water quality of the lake. As the productivity of a lake increases the water quality reduces, thus productivity forms a basis for classifying lakes (Lodh et al. 2014, Mishra et al 2014).

### STORM WATER DRAINAGE EFFECTIVE DESIGN AND USAGE

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Abstract: Storm water drains during rainy season and storms due to heavy down pour get undated leading to water logging and flooding. This is a common problem seen in urban areas. Narrow drains, desilting, illegal acquiring of areas related to the drains add to unmanageable situations.

Infiltration galleries in these areas of excessive water or in region of flooded area can add to the solution of the problem. The water through these infiltration galleries can be stored and can be out to use for various purposes. This diversion minimize the water logging in downstream side. If this concept being introduced under SWD, sole burden on such SWD will be drastically deduced. SWD cum infiltration galleries perform on dual mode can be used to handle instant heavy rain water.

IndexTerms: Strom water, Slot/Screen pipes, woven Geotextiles.

#### I. INTRODUCTION

Water logging is the major issue during monsoon season in urban India. Roads are blocked leading to traffic jams, pedestrians have to wade through flooded streets, urban poor living in slums or quarters have their home often damaged by water and also the water becomes polluted when it mixes with the garbage and waste i.e. littered everywhere and apart front disrupting traffic it also becomes a risk to health. Road drainage design has its basic objective as the reduction & elimination of energy generated by flowing water, therefore water must not be allowed to develop in sufficient volume or velocity so as to cause excessive wear along ditches, below the culvert or along exposed running surfaces.Presence of excess water or moisture within the roadway will adversely affect the engineering properties of the materials with which it was constructed.

Spray from rainwater being thrown up by car tires can reduce visibility which can lead to delays in reacting to events on the arriageway. Drag on car tires from local rainwater ponding can alter the balance of vehicles travelling at speed which can be alarming or cause skidding. It is incompressible therefore standing water effectively acts as jackhammer on the wearing course right through to the sub-base when vehicles pass over head. In extreme storms, rainwater can simply wash away roads. **Surface Drainage System** is the removal of water that collects on the land and surface. Provision must be made for removal of water, from rain or melting snow, or both that falls directly on a road or comes from the adjacent terrain.

The channels should be located and shaped to minimize the potential for traffic hazards and accommodate the anticipated stormwater flows. Drainage inlets should be provided as needed to prevent ponding and limit the spread of water into traffic lanes.

Use of slotted pipes in a drainage system with a perforated pipe at the base is one of the solutions to the problem. Runoff flows slowly through the granular material, trapping sediments providing attenuation.

#### **II. MATERIALS**

Coarse aggregates: The Aggregates used in the slotted pipe installation passed through 16mm & retained on 12mm sieve this aggregate medium act as previous concrete, which allows the water to percolate easily & enters the pipe.

Gravel: is extremely effective filter media because of its ability to hold back precipitates containing impurities. The primary role of the gravel is to prevent clogging of the PVC Pipes with sand.

Effective sizes	1/8" to 2 1/2"
Uniform coefficient	1.2 to 1.7
Specific gravity	2.7
Moh's hardness	6
Density	100lbs per cubic foot

Table 1: Properties of materials to be used

Table 1

Slotted or screen pipes: used for casing in ground water section to allow water to enter the ground. These pipes are also used to provide soak ways for storm water or rain water to infiltrate back into surrounding ground.

These percolation pipes also used in roof top water harvesting in the form of percolation pit to recharge the ground water. Slotted pipes also used for controlling and reducing volumes of discharge into existing main sewer systems and water courses.

Size	No of rows	Slot width	Distance b/w slot	Slot width	Distance b/w slot	Slot length
35	3	0.5	6	1.5	9.5	25
40	3	0.5	6	1.5	9.5	28
50	3	0.5	6	1.5	9.5	36
80	3	0.5	6	1.5	9.5	56
100	5	0.5	6	1.5	9.5	43
115	5	0.5	5.5	1.5	8.5	48
125	5	0.5	5.5	1.5	8.5	48
150	5	0.5	5.5	1.5	8.5	57

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### Groundwater Quality and Management in Devanahalli Taluk, Bangalore Rural District, Karnataka, India: A Case Study

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#### Abstract

The quality and quantity of groundwater depends upon climate, physiography, geology and human settlement. Earlier groundwater was considered to be less vulnerable for contamination when compared to surface water. But of recent it is at the peak of contaminations, envisaging for proper management techniques. The present study area being close to Bangalore metropolis, the impact of urbanization on the taluk on various fronts has been observed. The area lies between Lat 13° 5' to 13° 23' and Long. 77° 33' to 77° 51', with an aerial extent of 582 sq. kms. The average rainfall is 725mms. The area is covered by lateritic and lateritic gravely soils followed by red soils. The major rocks types are granites and granitic gneisses with pegmatite veins intruding. The inference drawn are based on the analysis of groundwater samples collected in the study area. Bangalore city being close to this area, it depends on day-to-day life for fresh fruits and vegetable. As a consequence, the farmers of this area, along with traditional crops have resorted to grow vegetable, groundnut, ginger, mulberry, grapes and citrus fruits to meet the city demand, which is more lucrative for them. This has resulted in over exploitation of groundwater. The important factor in deterioration of groundwater quality from non-point source contamination wherein chemical laced water is seen due to excess usage of chemical fertilizers, pesticides and insecticides in agricultural activity. The anomalies are noticed with respect to constituents such as Ca, Na, K, Cl and NO<sub>3</sub>.

#### Keywords: Groundwater, Pollution, Agrochemical, Rainfall, Devanahalli

#### I. INTRODUCTION

The variation in monsoon has created a situated wherein the dependence on groundwater is significant fora agricultural practices. The vast source of groundwater is being grossly misused due to various factors and a situation is seen where managing it, in a most efficient way is order of the day. For management of this resource, an integrated approach is necessary as the resource is becoming scarce due various developmental activities. Groundwater was less vulnerable for contamination when compared to surface water, but of recent it is most debated issue envisaging for proper management techniques to overcome contamination. Though quality and quantity depend on factors such as climate, physiography, geology and human settlement. The present study highlights the impact of urbanization of Bangalore metropolis on the Devanahalli taluk on various fronts of groundwater resource.

#### **II. LOCATION**

The study area lies between Lat.  $13^{\circ}$  5' to  $13^{\circ}$  23' and long.  $77^{\circ}$  33' to  $77^{\circ}$  51' with an aera of 582 sq kms. The mean annual precipitation is 725mms. The area under present study is 35 kms from Bangalore metropolis and Bangalore – Hyderabad National Highway passes Devanahalli town. The taluk is drained by South Pinakini and Arkavathy rivers. The nearest airport is Kempegowda International Airport, Bangalore.

#### III. GEOLOGY AND SOILS

The rock formations in the study area are granites and granitic gneisses with intrusions of pegmatitic veins. The granites in the study are exposed very well in several places as small plutons and these out crops of the granites weathered to a large extent. Due to weathering of granites and granitic gneisses formation of red soil is noticed several places. The weathering of rock types has been observed to a depth of 20-25mtrs. The soils of the taluk are lateritic and lateritic gravely, followed by red loamy soils. The soils are highly alkaline in character and potash content in the soil is very high. The soils have an infiltration rate of 1.60 to 3.50

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### Influence of Manufactured Sand on Mechanical Properties of Self Compacting Concrete

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Abstract - This experimental work aims to investigate the effect of manufactured sand on mechanical behavior of selfcompacting concrete. In the present study, natural river sand has been replaced by manufactured sand for fine aggregates, in the percentages of 0, 25, 50, 75, and 100. A total of 54 cubical specimen measuring  $0.15 \times 0.15 \times 0.15 \times 0.15$  meters, 45 cylindrical specimen measuring  $0.15 \times 0.15 \times 0.3$  meters and 20 prism specimen measuring  $0.5 \times 0.1 \times 0.1$  meters were cast respectively to study the compressive, tensile and flexural strength of the self – compacting concrete after a curing period of 7, 14 and 28 days. It was observed that the addition of manufactured sand enhanced the mechanical properties of self-compacting concrete.

Index Terms - Self-compacting concrete, Self-consolidating concrete, Artificial sand, Manufactured Sand, M-sand.

#### I. INTRODUCTION

Self-compacting also known as self-consolidating concrete, is a concept that was proposed by Prof. Okamura at Ouchi University – Japan, in 1986. During that time skilled labor was in a limited supply, and this caused major setbacks in the construction industry. Self-compacting concrete was designed to flow under its own weight, thus eliminating the need for external compaction using vibrators, especially in structures where heavy reinforcements were provided to handle the loads coming on them. Heavy structures require provision of heavy reinforcement and concrete with medium to high strength. The self-compacting concrete met these requirements at the time when the construction industry was suffering with shortage in skilled labor.

The construction industry is continuously facing challenges of depleting resources and increasing carbon emissions. Sustainable development and use of alternative building materials to replace the conventional materials used in concrete, is the need of the hour, to meet these challenges. Manufactured-sand, is one such material, which has been allowed as a replacement to natural river sand by Bureau of Indian Standards (IS 383:1970), to be utilized in concrete as fine aggregates. Manufactured-sand is much more an<sub>1</sub> ular and has cubical shaped particles when compared to that in the natural river sand. Angular shape of these fine aggregate particles, leads to improved strength, when used in concrete, due to better internal interlocking of particles.



Fig. 1 Manufactured Sand

#### **II. RESEARCH OBJECTIVES**

The main object of this experimental process is to study the rheological and mechanical behavior of self – compacting concrete using manufactured-sand.

### **Real-time early detection of weed plants in pulse crop field using drone with IoT**

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Revanasiddappa, B., Arvind, C. S. and Swamy, S. (2020). Real-time early detection of weed plants in pulse crop field using drone with IoT. International Journal of Agricultural Technology 16(5):1227-1242.

**Abstract** The real-time detection of parthenium weed plants in the pulse crop field was carried out using low altitude flying drone. A fully convolutional semantic segmentation model was proved to accurately perform object segmentation with higher time complexity. In this research, the LinkNet model with Resnet-34 was used for real-time detection of weed plants using a video feed from low altitude flying drones. Experimental results is proven that LinkNet-34 can detect overlapping and irregular shape weed objects at 0.86 mean pixel accuracy of 0.598 mean IoU at 0.217s. The processing speed was better compared to LinkNet and U-Net models. The detected weed images were stitched together to create a weed site map. The created map is automatically uploaded to google cloud for further site analysis.

Keywords: Deep learning, LinkNet, ResNet, Site map, U-Net, Unmanned aerial vehicle, Weeds

#### Introduction

Pulses are one of the major food crops feeding over 80% of the Indian population (Annual Report, 2017-18), eradicating malnutrition and providing a good amount of protein and better economic profit for the farmers. However, the yield of pulses, year after year, is going down due to the weeds in farmlands impeding the growth of pulse crops. Weeds in the farmlands have decreased pulse production by competing for light, nutrients, moisture in the pulse-field (Tshewang *et al.*, 2016). In traditional farming, de-weeding is done by spraying pesticide/herbicides without distinguishing pulse crops with weeds. This methodology not only results in a waste of pesticide/herbicides, but it also causes environmental and health hazards for humans (Wiles, 2009). Smart site-specific weed management that reduces pesticide consumption by 50% and environmental pollution which increases crop yield resulting in economic

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#### A Review on Cyberbullying Detection using Machine Learning

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Abstract - Social media is being extensively used today. This has led to a form of bullying that is Cyberbullying. Bullies use various network sites to attack victims with offensive comments and posts. This has been so devastating that many youngsters undergo depression, commit suicide, lose their selfconfidence, and much more. With anonymity and lack of supervision this form of bullying has increased exponentially. It is also very challenging and difficult to monitor such cases. This leads us to find a way to help people out and protect them from such vulnerable attacks. Machine Learning has various algorithms that help us in detecting cyberbullying with some algorithms outperforming the others thereby leading us to the best algorithm.

## *Key Words*: cyberbullying, machine learning, convolutional neural network, deep learning, feature extraction, text classification.

#### **1. INTRODUCTION**

Cyberbullying has been a major cause of worry for the amount of serious impact it has on people. Although social media is a secure place for communication it is prone to cyberbullying. It is found to be more dangerous than traditional bullying because the humiliation is visible to an unlimited online audience. Since the physical appearance of the victim is not required it can go on nonstop. Many networking sites don't even need a real name to be registered as a user making the bullies braver. The victims who have undergone bullying lose their self-confidence, become antisocial and this has a bad effect on their mental health as well. This leads us to detect cyberbullying. Hence machine learning techniques are employed in this paper. The steps involved are:

- Collecting datasets from networking sites which consist of videos, images, posts, and comments.
- Pre-processing data so that it contains only relevant information
- Classification of data into positive and negative instances of cyberbullying.

#### 2. LITERATURE SURVEY

In 2020, Vimala Balakrishnan et al. [1] presented an automatic cyberbullying detection taking Twitter users' psychological features into account. The three main stages discussed in improving cyberbullying detection are Twitter data collection, feature extractions, and cyberbullying detection and classification. The annotated dataset contained 9484 tweets, out of which 4.5% of users are labelled as bullies, 31.8% as spammers, 3.4% as aggressors, and 60.3% as normal. However, the final dataset contained 5453 tweets as a result of the pre-processing step which included removing non-English tweets, profiles containing no data, and special characters. The features extracted were text features, user features, and network features. The model was executed using WEKA 3.8 with 10-fold cross-validation. Since Naïve Bayes performed poorly during preliminary experimental analysis it was eliminated while Random Forest and J48 continued to perform well. The classifiers were trained using manually annotated data.

In 2020, Jaideep Yadav *et al.* [2] proposed a novel pretrained BERT model developed by Google researchers that generates contextual embeddings and task-specific embeddings. In the proposed method, for the base model, a deep neural network called the Transformer is used. The Bert contains 12 layers to encode the input data and is built on top of a base model. The data is tokenized and padded accordingly and is fed into the model which generates the final embeddings. The classifier layer classifies the embeddings generated by the previous layers and generates the final output accordingly. Using a pre-trained BERT model they were able to achieve efficient and stable results in comparison to the previous models to detect cyberbullying.

In 2020, Sudhanshu Baliram Chavan *et al.* [3] proposed the approach to detect cyberbullying on Twitter. The required dataset was collected from sources like GitHub, Kaggle. Initially, the data is pre-processed and features are extracted using a TFDIF vectorizer algorithm. These tweets are then passed through the naive Bayes and SVM model and are classified accordingly. When a tweet is categorized as bullying, ten other tweets from that users' account will be fetched and passed through naive Bayes and SVM classifiers again. If the overall probability of that user's tweets lies above 0.5 then it will be considered as a bullied tweet. Based on the accuracy score and the results it was evident that the SVM model outperformed the naive Bayes with the accuracy score of 71.25%.



#### A Review on Lung Cancer Detection from CT Scan Images using CNN

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**Abstract** – One of the major causes of death in humans is due to a disease called Lung Cancer. Cancer is a disease in which cells in the body grow out of control and is one of the most serious health issues. Lung cancer is the uncontrolled cell growth in tissues of lungs. Early detection of the cancer helps the physicians to act quickly which in turn which increase the survival chances of the infected patients. This is a review paper wherein different methodologies for the detection of Lung Cancer from Computed Tomography (CT) scan images are presented. It is observed that Convolution Neural Network along with Image Processing is the most suitable approach to detect the Lung Cancer from the CT scan image which is provided as input.

#### *Key Words*: Lung Cancer, Convolution Neural Network, Image Processing, Computed Tomography, Watershed Segmentation.

#### 1. Introduction

Cancer is one among the foremost serious health problems within the world. Cancer disease is caused due to the out-ofcontrol growth of the cells in the body parts. Among the different types of cancer, Lung Cancer is the most dangerous type of cancer. This is due to the fact that its one of the leading causes of death in both men and women and also according to World Health Organization, it was seen that 2.09 Million cases of Lung Cancer was found and a sum of 1.76 Million people died due to the Lung Cancer in a single year of 2018. The cause for the large number of people getting infected with lung cancer is the fact that there are many ways present surrounding us and with the use of these or by coming in contact with these like Smoking and many more, we will be quickly prone to be infected with Lung Cancer. Also, the reason for high death rates is because of the late detection of the cancer. All these factors make it necessary to devise a methodology using current technology which can help to Detect the Lung Cancer from the scanned images of the Lungs. Once the Lung cancer is detected, there are various possible biological treatments available which includes Thoracic Surgery, Chemotherapy, Radiotherapy. Depending on the Cancer stage and other factors, the physicians can choose the appropriate treatment for the Lung Cancer. Hence, if the cancer is detected at the early stage, the chances of survival of the patient increases.

A literature survey is made on the possible techniques and methodologies which can be used to detect the Lung Cancer.

There are various techniques, methodology and technology which can be used to accomplish the required objective.

#### 2. Literature Review

Disha Sharma *et al* (2011),[1] gave an approach for early detection of disease called lung cancer by processing lungs CT images using Image Processing techniques. The authors used bit-plane slicing, erosion and Weiner filter image processing techniques. These techniques are used to extract the lung regions from the Computed Tomography image. Later the extracted lung regions were segmented using Region growing Segmentation algorithm. Once the segmentation was done Rule based Model was used to detect the cancerous nodules. It was observed that the above methodology gave an accuracy of 80%.

Anita Chaudhary *et al* (2012), [2] proposed a methodology for the lung cancer detection on a CT image by using Image processing. The pre-processing stage included image enhancement where Gabor filter and Fast Fourier transform techniques were used and further for image segmentation watershed algorithm was applied. Later feature extraction of the segmented image was done to specify the area, perimeter and eccentricity features which was used to detect and classify the lung nodules.

Hamid Bagherieh *et al* (2013),[3] proposed a methodology to detect the lung nodules and also give the classification of the same using Image Processing and Decision-Making techniques. First and foremost, image pre-processing was carried out on the CT scan images and the pre-processing was done using the techniques called contrast enhancement and linear filtering. Further, the filtered image was segmented using Region growing Segmentation process. Further the features like size, area and color were considered and were given as input to the Fuzzy system which employed fuzzy membership function to detect and classify Lung Cancer.

Prashant Naresh *et al* (2014), [4] specified the approach to detect the lung cancer using Image processing and Neural Network Techniques. Initially the CT scanned image of lung was filtered to remove Gaussian white noise and Otsu's threshold technique was used to do the segmentation of the image. The structural features were extracted and were used which were given as input to the machine Learning classifier. The Support Vector Machine and Artificial Neural Network



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### 24 × 7 Smart IoT Based Integrated Home Security System

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Abstract: 24/7 smart iot based home security system is developed using different sensors and modules to safeguard the user properties or things under all the situations This system will work for 24/7 whether the user is inside or outside the home This system identifies if there is any gas leakage, fire breakout or for any unknown person entering the house if so our system gets alert and sends messages (sms) to user accordingly system uses raspberry pie camera to record all the events that occur inside the house and these recordings are stored in cloud neither in local because to keep our system cost effective. All the recordings can be seen and downloaded by user whenever he wants to. So we have developed a 24/7 smart iot based home security system.

Keywords: security, raspberry pie, fingerprint sensor (r307), motion sensor, temperature sensor(dth-11),gas leakage sensor(mq-135)

#### I. INTRODUCTION

As we have been noticing in the recent times that the illegal activities are increased in a huge extent especially robbery and everyone wants to safeguard their goods from all these illegal crime rates hence we made up our mind to develop this system which safeguards the goods and property of the user whether he/she is inside or outside the house. Since the present living situations is very tough for all of us ,we all are forced to get into the high expensive markets for buying security instruments to safeguard the house such as fire or gas alarms. However it simply triggers an alarm and for recordings, videos and pictures we need to separatly buy all the instruments from markets with subject to monthly subscriptions because these are all handled by the security service companies. previous systems implemented either only gas or fire but our system is an all in one approach with fire, gas and intruder detections.

#### **II. LITERATURE SURVEY**

Md Saifudaullah Bin Bahrudin et al. [1] The proposed Fire alarm system is a real-time monitoring system that detects the presence of smoke in the air due to fire and captures images via a camera installed inside a room when a fire occurs. The embedded systems used to develop this fire alarm system are Raspberry Pi and Arduino Uno. The key feature of the system is the ability to remotely send an alert when a fire is detected. When the presence of smoke is detected, the system will display an image of the room state in a web page. The system will need the user confirmation to report the event to the Firefighter using Short Message Service (SMS). The advantage of using this system is it will reduce the possibility of false alert reported to the Firefighter. The camera will only capture an image, so this system will consume a little storage and power.

Ashish Shrivastava et al. [2] Gas leakage is a major problem with industrial sector, residential premises and gas powered vehicles like CNG (compressed natural gas) buses, cars. One of the preventive methods to stop accident associated with the gas leakage is to install gas leakage detection kit at vulnerable places. The aim of this paper is to present such a design that can automatically detect and stop gas leakage in vulnerable premises. In particular gas sensor has been used which has high sensitivity for propane (C3H8) and butane(C4H10). Gas leakage system consists of GSM (Global System for mobile communications) module, which warns by sending SMS. However, the former gas leakage system cannot react in time. This paper provides the design approach on both software and hardware.

A.Mahalingam et al. [3] Gas leakage is a major concern with residential, commercial premises and gas powered transportation vehicles. One of the preventive measures to avoid the danger associated with gas leakage is to install a gas leakage detector at vulnerable locations. The objective of this work is to present the design of a cost effective automatic alarming system, which can detect liquefied petroleum gas leakage in various premises. In particular, the alarming system designed has a high sensitivity for primarily butane, which is also individually sold bottled as a fuel for cooking and camping. The proposed system is designed to meet UK occupational health and safety standards. Test results are demonstrated for an USB powered gas leakage detection system and it gives early warning signals under less severe conditions and activates a high pitched alarm in case of emergency situations to safeguard the users.

Sajid M. Sheikh et al. [4] Fire alarms and building security systems are currently separate systems and are liable to monthly fees. Video recording for closed-circuit television (CCTV) is done locally subsequently requiring high storage space. Whenever there is a break-in, the footage records can be stolen consequently losing data.



#### **Object Detection using Deep Learning with OpenCV and Python**

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**Abstract** - Computer Vision is a field of study that helps to develop techniques to recognize images and displays. It has different features like image recognition, object detection and image creation, etc. Object detection is used in face detection, vehicle detection, web images, and safety systems.

The Objective is to distinguish of objects utilizing You Only Look Once (YOLO) approach. This technique has a few focal points when contrasted with other object detection algorithms. In different algorithms like Convolutional Neural Network, Fast-Convolutional Neural Network the algorithm won't take a gander at the image totally yet in YOLO the algorithm looks the image totally by anticipating the bounding boxes utilizing convolutional network and the class probabilities for these boxes and identifies the image quicker when contrasted with different algorithms.

Using these techniques and algorithms, based on deep learning which is also based on machine learning require lots of mathematical and deep learning frameworks understanding by using dependencies such as OpenCV we can detect every single object in image by the area object in a highlighted rectangular box and recognize every single object and assign its tag to the object. This additionally incorporates the exactness of every strategy for distinguishing objects.

#### Key Words: YOLO, Convolution neural network (CNN), Fast-CNN, OpenCV

#### **1. INTRODUCTION**

Object detection is perhaps the main exploration research in computer vision. Object detection is a technique that distinguishes the semantic objects of a specific class in digital images and videos. One of its real time applications is selfdriving vehicles or even an application for outwardly hindered that identifies and advise the debilitated individual that some object is before them. Object detection algorithms can be isolated into the conventional strategies which utilized the method of sliding window where the window of explicit size travels through the whole image and the deep learning techniques that incorporates YOLO algorithm. In this, our point is to distinguish numerous objects from an image. The most well-known object to identify in this application are the animals, bottle, and people. For finding the objects in the image, we use ideas of object localization to find more than one object in real time. There are different techniques for object identification, they can be separated into two classifications, initial one is the algorithms dependent on Classifications. CNN and RNN go under this classification. In this classification, we need to choose the

interested areas from the image and afterward need to arrange them utilizing Convolutional Neural Network. This strategy is slow as we need to run an expectation for each selected area. The subsequent class is the algorithms dependent on Regressions. YOLO strategy goes under this classification. In this, we won't need to choose the interested regions from the image. Rather here, we predict the classes and bounding boxes of the entire image at a single run of the algorithm and afterward distinguish different objects utilizing a single neural network. YOLO algorithm is quicker when contrasted with other grouping algorithms. YOLO algorithm makes localization errors but it predicts less false positives in the background.

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#### 2. LITERATURE SURVEY

In the year 2017 Tsung-Yi Lin, Piotr Dollar, Ross Girshick, Kaiming He, BharathHariharan, and Serge Belongie proposed Feature Pyramid Networks for Object Detection. With the launch of Faster-RCNN, YOLO, and SSD in 2015, it seems like the overall structure an object identifier is resolved. Analysts begin to take a gander at improving every individual pieces of these networks. Highlight Pyramid Networks is an endeavor to improve the identification head by utilizing highlights from various layers to frame a feature pyramid. This feature pyramid thought isn't novel in computer vision research. In those days when highlights are still physically planned, feature pyramid is now a powerful method to recognize patterns at various levels. Utilizing the Feature Pyramid in deep learning is likewise not a groundbreaking thought: SSPNet, FCN, and SSD all showed the advantage of aggregating multiple layer highlights before classification. Nonetheless, how to share the feature pyramid among RPN and the region-based detector is still yet to be resolved.

In the year 2017 Kaiming He, Georgia Gkioxari, Piotr Dollar, Ross Girshick proposed Mask R-CNN.In this paper Mask R-CNN is certainly not a commonplace object detection network. It was intended to settle a difficult example division task, i.e, making a mask for each object in the scene.



### **Opinion Mining of Twitter Users using Machine Learning**

#### Khushi Pattanshetty<sup>1</sup>, Prashant Tiwary<sup>2</sup>, Priyesh<sup>3</sup>, Samridhi Shreya<sup>4</sup>, Mr. Elaiyaraja P<sup>5</sup>

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Abstract- Social media services like Facebook, Twitter. LinkedIn, Reddit and many others have become prominent platforms for people across the globe to share their thought, feelings, insight, and emotions in a wide domain spanning across politics, administration, fashion and technology. Amongst these, Twitter is a free and extremely popular public opinion platform and is the best source for collecting textual data. It enables users to post and interact with messages known as tweets. Opinion mining, or sentiment analysis, is a text analysis technique that uses computational linguistics and natural language processing to automatically identify and extract sentiment within text. In this paper we have presented a survey of the user's stance on certain topics in order to understand the concept of opinion mining, real time data collection and learning the different machine learning models.

*Keywords-* Opinion Mining, Twitter, Pre-processing, Feature Extraction

**Introduction**- Sentiment analysis, also referred to as opinion mining, is an approach to natural language processing which deals with the detection and classification of sentiments in a text. It is used to sort out people's opening on and their feelings about different subject such as any movie, product, song, etc. and to differentiate between positive, neutral, and negative with respect to different social media platforms such as Facebook, Twitter, etc. Twitter is a free and most popular social networking platform where users can give their opinion in form of tweets. Twitter has changed the current the current system in many dimensions. It has received a lot of attention from researchers in recent times. Around 350 million users post more than 600 million tweets everyday which makes Twitter like a corpus with valuable data for researchers. In this paper we will contribute to the field of sentiment analysis of twitter data using various machine learning algorithms.

#### Literature Survey-

In 2019, **Arti et al.[17]** dealt with the performance of Twitter's Opinion Mining for Indian Premier League 2016 using the random forest technique shown in fig 1. The data is divided into two parts the training dataset containing 70% and the testing sets containing 30% of the dataset. Tweets are classified into two classes 0 and 1 representing positive and negative opinions respectively. Comparing the actual class and the predicted class values the outcome is decided and depending upon whether true positive, False positive, True negative, False negative values are obtained the classification of the algorithm is checked for its correctness.



In 2019, **Dhruvi K. Zala et al.[16]** discussed about the N-gram model for prediction of people's opinion on Twitter about current affairs wherein NSR is generated and calculated for N-grams and Hybrid features. An N-gram is a contiguous sequence of n items from a given sample of text or speech. Graphs plotted depicted that the score value was highest for the unigram model followed by unigram model including all features at the feature extraction level, followed by N-gram model and finally it was observed that the N-gram model including all features at the feature extraction level gave the lowest value thereby producing the best result.

In 2018, **Garry Simon et al.[11]** discussed about the influence of Opinion Mining of data collected from Twitter on the market value of a business brand. The methodology applied for opinion mining is Hadoop Map-Reduce Framework, a Map-Reduce algorithm. Map takes a set of data and breaks it into tuples, after that Reduce takes the tuples from map and combines the tuples into a smaller set of tuples. Hadoop Ecosystem consists of two components, namely HDFS (Hadoop Distributed File System) and Map Reduce for Processing. HDFS is designed on a Master-Slave Architecture. The job of a JobTracker is to schedule map and reducing tasks into available slots at one or more TaskTrackers. The client is notified once the conclusion is drawn.

In 2018, **Wiwin Suwarningsih et al.[12]** explained the generation of question-answer pairs from opinion statements collected from twitter in Bahasa Indonesia.



#### **Fake News Detection using Machine Learning**

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**Abstract** - Newspapers are the primary source of news for people worldwide. However, off late, due to the significant growth and updates in technologies, there has been a stupendous rise in the popularity of social media. The number of people who use social media has increased remarkably. As a consequence, social networks such as social media, websites, blogs, etc. have emerged as relevant platforms to gather all kinds of news. People rely more on social networks than newspapers these days. With the availability of the internet, these networks can be accessed easily. This can lead to easy manipulation of the existing news, thereby causing fake news. Fake news can be used as a vital tool to project people in a wrong way. It can spread hate among people which can further harm the society. Hence, it is very necessary to prevent the spread of fake news. This survey paper describes the various methods and models used for the detection of fake news. Our project aims to use Natural Language Processing to directly detect fake news, based on the text content of news articles.

*Key Words*: Fake news, Fake news detection, Machine learning, Natural Language Processing, Python, Corpus, Classifier, Dataset.

#### **1. INTRODUCTION**

In the modern era, the spread of fake news has become very evident. Fake news is being used for both economic and political benefits. The need of the hour is to prevent the spread of fake news. The first thing that needs to be done to achieve this is to detect fake news.

Our project aims to develop a machine learning program to identify when a news source may be producing fake news. We use a corpus of labelled real and fake articles to build a classifier that can make decisions about information based on the content from the corpus. Our model focuses on identifying sources of fake news, based on multiple articles originating from a source. Once a source is labelled as a producer of fake news, we predict that all future articles from the same source are also a producer of fake news.

The intended application of our project is to assist in applying visibility weights in social media. Social networks can make use of the weights produced by the model to obscure stories that are highly likely to be fake news.

#### 2. LITERATURE SURVEY

Rohit Kumar Kaliyar (2018) proposed Fake News Detection Using A Deep Neural Network. In this proposed system they have used Natural language processing, Machine learning and Deep learning techniques to implement this model and compare which model will give more accurate results. They utilized the DGX1 nvidia computer to get accurate results and divide the dataset into real and fake news. This model contains varieties of machine learning algorithms such as K nearest neighbour (KNN), Naive bayes (NB), Random forest (RF), Decision tree (DT). They have investigated deep learning models such as Shallow convolution network (SCN) and also Very deep convolutional network (VDCN) and gated networks such as Gated recurrent Unit (GRU) with the help of Convolution Network and Long short-term memory (CN-LSTM). They additionally investigated the adequacy of word embeddings and also, word2vec highlights with Deep neural networks. This model utilizes chi2 for inclusion in the Machine learning model to produce more accurate results.

Wenlin Han (2019) proposed Fake news detection in social networks using machine learning and deep learning performance evaluation. In this proposed system they have referred to some traditional machine learning approaches such as Deception modeling, clustering, Naive bayes are evaluated for accuracy detection TF-IDF and PCFG with Convolution neural network and Recurrent neural network models are assessed to think about the execution with conventional machine learning techniques. Deep Modeling speaks in high space dimensional text and computer algorithms that need extracted text to display in a reasonable way. Fake information and fake articles have a great measure of normal properties so to characterize them Naive Bayes classification is applied. The accuracy of the system is utilized using diverse methods such as bigram recurrence which is utilized by TF-IDF and PCFG with the combination of both methods. The CNN and RNN models are referred for text mining or picture recognition also RNN for time and arrangement based expectations.

Ranojoy Barua (2019) proposed An Application for Fake News Article Detection using Machine Learning Techniques. This system is developed based on machine learning approaches such as Long short term (LSTM) and Gated recurrent unit (GRU) to characterize a information into spam or original. The trial results on the dataset arranged in this work looks accurate. The model is additionally prepared and tried on other data and similar



### Image Completion and Image Super Resolution Using Generative Adversarial Network

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**Abstract** - Deep learning AI is proven to get more and more accurate over the years. It can now learn without any human supervision and perform tasks with the precision of man himself. GAN is an evolving technology that has achieved excellent accuracy and seems to be progressing much more over time. Its various applications include image inpainting, video frame generation, language processing, and much more. This paper will explore the working of a GAN model and study more into what it is. We shall also look at two applications of GAN in detail.

*Key Words*: Generative Adversarial Network, superresolution, boundless, image-inpainting, Deep Learning

#### **1. INTRODUCTION**

GAN was first introduced in 2014 by Ian Goodfellow and his colleagues. The basic idea was that of two models in constant competition, meaning one's loss is another's gain. This approach leads them to produce realistic, nondifferentiable protégées of the input. For example, if we were to input a video, the output would also be in the form of a video. GAN models are trained to identify patterns or similarities from the inputs, and they can create items that are very closely related to the input. GAN has proven itself in various difficult tasks such as improving resolution, generating facial expressions, and much more.

We shall look at the basic working of GAN and check out a basic algorithm of the same. We will also have a peek at two widely used GAN models that help us in altering images.

#### 2. BASIC STRUCTURE OF GAN

#### 2.1 Basics of GAN

Generative Adversarial Network is a part of deep learning that comprises two models: the Generator and Discriminator. It uses both these models to generate a realistic vision that can sometimes even fool the naked eye. Convoluted Neural Networks are used for both Discriminator and Generator. GAN is based on a zero-sum game, where the sum of both people's interests is zero, and one gains precisely what the other loses.

The Generator's main task is to identify, learn, and capture the input, a fixed-length random vector (from a Gaussian distribution). After training, the problem domain points will correspond to points in the multi-dimensional vector space. This will form the entire compressed data distribution representation. The generator model applies to aim to points during a chosen latent space. Such new points drawn from the latent space are often provided to the generator model as input and practice to generate new and different output examples. The Generator uses deconvoluted neural networks. The generator model is kept after training to generate more examples.



#### Fig 1: A brief structure of GAN

The Discriminator uses a convoluted neural network model and takes data from the domain, and it mainly classifies that data as real or fake. This is predicted using binary class. After training, the Discriminator is discarded, and only the Generator is used to generate the output. This Discriminator is given data from the Generator as well as the input to differentiate. The Discriminator is trained again based on how well it identifies the real and fake images. Subsequently, even the Generator is altered and made better on how well the Discriminator identified its outputs.

#### 2.2 Mathematical model and Training Model

GAN can be viewed as an interaction between two unique models: the generator and the discriminator. Subsequently, each model will have its loss function. In this part, we should attempt to spur a natural comprehension of the loss function for each. Here are some terms to keep in mind before getting into the mathematical explanation.

x : real data; z : latent vector; G(z) : fake data; D(x) : Discriminator's evaluation of real data; D(G(z)) : Discriminator's evolution of false data; *Error* (a,b): Error between a and b.



#### **Review on Brain Tumor Cells Detection using Image Processing**

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**Abstract** - Brain is the major part which controls the human body. It regulates various functions such as knowledge, personality, memory, hearing, vision, problem solving and many more functions. The main reason for brain tumors to develop is the uncontrolled growth of brain cells. Many health institutions have recognized brain tumor to be one of the major concerns that is causing most deaths all over the world. Identifying the brain tumor at an initial stage offers a hope of successful medical treatment. Use of MRI images have turned out as more accurate and more reliable images compared to CT images. The MRI images are then fed to the system as input on which the analysis is done to detect presence of tumor cells in our brain. The model performs three major tasks which include Image Processing, Feature Extraction and Classification. The image processing involves the extraction and segmentation of the input MRI image using image processing techniques. The feature extraction is done using the Genetic Algorithm that helps to select and extract the useful features of the segmented image obtained from Watershed Algorithm. The Classification task uses a classifier which is modelled using the Convolutional Neural Network (CNN) that will classify the input image as with tumor cells or not based on the features extracted from the segmented image.

#### Key Words: Image Processing, Feature Extraction, Classification, Genetic Algorithm, Watershed Algorithm, **Convolutional Neural Network (CNN)**

#### **1. INTRODUCTION**

Brain tumor is the collective mass of abnormal cells that is accumulated in the brain. A skull, that encloses the brain, is very rigid & strong. Any growth inside the confined space of the skull can lead to issues. Brain tumors can be classified as cancerous (Malignant Cells - which are harmful) & noncancerous (Benign Cells - which does no harm to the individual). Benign tumor Cells are less harmful compared to malignant tumor as malignant cells develop fast, while benign are slow growing and cause less harm when compared to malignant Cells. When benign or malignant tumors tend to grow, it creates a pressure difference inside the skull to increase. This may lead to permanent damage to the brain, and it can lead to death of an individual. Brain tumors can be classified into primary or secondary. The first tumor develops in the brain. Many primary brain tumors are benign, whereas the secondary tumor, which is also called as the metastatic brain tumor, which is diagnosed when cancer cells spread to the brain from other organs, such as a lung or

the breast. At present, there are many biological or technical methods for the treatment of brain tumor. Therefore, this paper focuses on the detection of the tumor cells which plays a crucial factor in the treatment and further increases the survival rate after the treatment. Also, if brain tumor is detected, an attempt is made to predict the survival rate of the patient post-surgery which will help the doctors to take the proper decision for the medication and also to decide if it is good to carry in with the operational procedure or to drop operating the patient. Medical imaging technique creates a visual image of the interior structure of the body of a human for medical as well as research purposes and non-invasive possibilities can be diagnosed by this. A varied set of medical imaging technologies based on non- invasive approaches like; MRI scan, CT scan, SPECT, PET Ultrasound, and X-ray are available. When compared to other techniques, Magnetic Resonance Imaging (MRI) is majorly used as it is cost effective and it provides images with greatest contrast of the brain cells and cancer-causing tissues. Therefore, identifying the brain tumor can be done easily done using the MRI images.

#### **2. LITERATURE SURVEY**

In 2020, Suresha D and others (1), proposed a methodology for detecting the tumor cells by combining K means technique and SVM. In the first step, the initial image is converted to a gray-scale image with binary thresholding technique and the spots that are detected is represented in terms of the intensity of the spot, to differentiate between a normal brain and a tumor infected brain. The set of features that are extracted is later featured by K Means algorithm, then the tumor recognition is done with the SVM. The designed modules include Binary Thresholding, SVM classifier and K- means clustering. The SVM is used to analyze the data that belongs to one or another category.

In 2020, Shargunam S and others (2), proposed a methodology which aims at identifying the tumor affected cells using MRI images and compared it with the performance of various classifiers like Support Vector Machine and Artificial Neural Network using the image processing Techniques. Initially image preprocessing was carried out on MRI images which involved steps such as gray-scale image conversion, noise reduction, and image reconstruction. Filtered image was segmented using the Otsu segmentation technique and then feature extraction was done. It was found 90.1% and 95.3% accuracy for SVM and ANN methods respectively.



#### **Image Caption Generator using Machine Learning**

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**Abstract** - As of late, with the fast improvement of innovation, the strategies that a machine can do is step by step expanding. One of these strategies is perceiving an image and giving us an outline of what's going on in that image in a language that is reasonable by people. This strategy joins the information on computer vision and natural language processing. Since artificial intelligence is the base information in acquiring the image captioning, numerous specialists are pulled in to it and has become an intriguing and challenging assignment. This paper presents a far reaching investigation of the cutting edge models and progression in exploration that has occurred in image captioning.

## *Key Words*: Computer Vision, Natural Language Processing, Artificial Intelligence, Image Captioning, Technology.

#### **1. INTRODUCTION**

Image caption generator is a mainstream research territory of computerized reasoning that manages picture understanding and a language depiction for that picture. To create an all-around framed sentence, we need the information on both syntactic and semantic comprehension of the language. Having the option to portray the substance of a picture utilizing precisely framed sentences is a difficult errand, yet have numerous significant applications like, it can help outwardly hindered individuals better comprehend the photos, in web-based media, picture ordering and so forth This errand is altogether harder in contrast with the picture characterization or article acknowledgment assignments that have been well-informed. The main undertaking is unquestionably having the option to make portrayal that can depict the items in the picture as well as the connection among at that point and the scene going on in that picture. This should be possible by understanding the climate of that image and the work done by the item.

Allow us to comprehend this momentarily utilizing a dataset model where two felines are dozing on a seat.



Fig -1: Dataset Example

At the point when a human investigate this image, the individual can say 'Two felines are dozing on a seat' or 'Two felines are dozing'. It appears to be simple for us people to take a gander at a picture and depict it fittingly. In any case, a machine or a PC doesn't have that capacity. So we need to give that capacity to machines utilizing a technique either by utilizing convolutional neural organizations or by utilizing profound learning and any dataset like flicker8k.

In this paper, we have investigated different works done in the space of picture inscribing. We have recorded down our discoveries in a consecutive request under the Writing study segment.

#### 2. LITERATURE SURVEY

(Oriol Vinyals, Alexander Toshev, Samy Bengio and Dumitru Erhan [1]) have introduced in their paper about a generative model dependent on a profound repetitive engineering that joins ongoing advances in PC vision and machine interpretation. This can be utilized to produce sentences depicting a picture. This model is prepared to boost the probability of the objective portrayal sentence given the preparation picture. This model gains exclusively from picture depictions. The present status of the workmanship BLEU score on the Pascal dataset is 25, this methodology gets 59, and the human presentation is around 69.

(Philip Kinghorn, Li Zhang, and Ling Shao [2]) have referenced in their paper that comprehensive strategies may lose subtleties identifying with significant angles in a scene. They proposed novel locale based profound



#### SOCIAL DISTANCING DETECTOR USING DEEP LEARNING AND OBJECT DETECTION

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**Abstract** - *The COVID-19 virus spreads among the people* who are in close contact for a long period. The chances of spreading virus is more when a person who is infected with the virus sneezes, coughs or talks near other people. The latest studies indicates that those people who are not infected with the virus is also likely to play a role in the spread of the virus. People can spread the virus even before they know they will fall sick. So it is very important for us to stay at least 6 feet or 2 meters away from other people even if you or they do not have any symptoms. In order to survive from the dangerous COVID-19, social distancing is the best method to be followed to reduce the spread of the virus. People are informed to avoid contact with other people. thereby controlling the spread of the virus. Artificial Intelligence and Deep Learning has shown good results on some daily life problems. In this proposed system Computer Vision and deep learning techniques are used to monitor social distancing between people at public places. To make sure that social distancing guidelines is followed in public places and workplace, the social distancing detection system can be used to monitor people whether they are maintaining safe distance of at least 6 feet from each other by analysing real time video streams or images from the cctv footages. This tool can be used to monitor people at workplaces, factories and shops by integrating it to their security camera systems.

### *Key Words*: Social distancing, COVID-19, OpenCV, Object Detection, You Only Look Once(YOLO).

#### **1. INTRODUCTION**

The pandemic situation has created problems all over the world and has made the conditions worst, as of now there is no vaccines developed for this contagious disease and therefore social distancing has become one of the best methods to prevent the spread of COVID-19. Social distancing means that people should physically distance themselves by maintaining a safe distance of at least 6 feet from one another. The cases have been increasing at a faster rate throughout the world, so it is very important to follow social distancing protocols. To monitor people at public places, this paper provides a promising solution. Using CCTV and drone footages human activities can be tracked at public places and also helps in monitoring the social distancing between people. People who come in large numbers at religious places makes it difficult to maintain social distancing. Due to the rapid spread of the virus many people are staying at their home but gradually people tends to visit public places, any events and tourist places and in those scenarios this system can help in detecting whether the social distancing is maintained or not between the people and will be useful all around the world.



Fig – 1: Social Distancing

With the help of CCTV footages we can monitor people and calculate the distance between the people using deep learning techniques and set the standard distance of 6 feet to be maintained between people and to detect people who violates the law.

Social distancing is one of the nonpharmaceutical approach to reduce the spread of COVID-19. It helps in reducing the spreading of the virus in a region by minimizing the contact between infected people and healthy people. The objective is to reduce the spread of the virus, thereby helping in declining the size of the epidemic peak, and helping the healthcare systems.

## Color Recognition using K-Nearest Neighbors Machine Learning classification algorithm trained with Color Histogram Features.

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**Abstract** - Color recognition plays important role in image processing techniques, for applications based on color, like object recognition, face recognition, skin color recognition etc. The accuracy of color recognition plays an important role in many applications. This paper is based on color classification by K-Nearest Neighbors classification algorithm and R, G, B Color Histogram is used to train KNN algorithm. It can recognize eight different colors namely White, Black, Orange, Yellow, Green, Red, Blue, and Violet.

### *Key Words*: Feature Extraction, K-Nearest Neighbors Classifier, Color Histogram.

#### **1. INTRODUCTION**

Many applications require real-time image processing like motion detection and color recognition. Color recognition has many applications including biometric identification, video surveillance, and object tracking. K-nearest neighbors (KNN) is widely used in neural network and machine learning algorithm. KNN algorithm is a supervised classification algorithm that needs labelled data to train on. By Using color histogram feature extraction, which is one among the image processing techniques, the features that distinguish these colors are determined. These features increase the effectiveness of the KNN classifier.

#### **2. LITERATURE SURVEY**

In 2020, **Rabia Bayraktar et al.[1]** proposed Colour recognition using colour histogram feature extraction and K-nearest neighbour classifier. The KNN classifier is used to distinguish twelve different colours. These colours are black, blue, brown, green, navy, orange, forest green, pink, red, violet, white and yellow. Colour histogram feature extraction method is used to extract features that distinguish the colours. Black and pink have the best accuracy (90%) with K=5. However, violet and yellow have the best ROC curve values. It can be seen from the results that training data and K value are very important in classification accuracy, and the accuracy is increased with appropriate training dataset and correct selected K values.

In 2018, **Shima Ramesh Maniyath et al.[2]** proposed soil colour detection using digital image processing. MATLAB coding is used for the process. From Munsell soil chart images is used for creation of database. HSV segmentation algorithm is used to segregate soil section from the background of given input image. Images are classified based

on their RGB values using KNN and images are labelled with Munsell soil notation. The output is acquired as per the Munsell soil notation.

In 2018, **P. Sudharshan Duth et al. [3]** proposed a method for using color thresholds for identification of 2-D images using the RGB Color model to detect colors. The colors detected here are red, green, blue, magenta, cyan and yellow. The given 3-D color image is converted into Grey-Scale image, then the two images are subtracted and two dimensional black and white picture is obtained, unwanted noise from the image is removed by median filtering. Detecting with a linked component digital images are marked in linked region. Metric for every marking area is calculated using bounding box and its properties. The shade of each image element is recognized by analyzing RGB value of each pixel.

In 2016, **Can Eyupoglu.[6]** proposed Color Face Recognition Using KNN Classification algorithm and PCA. KNN is used for classification of color face images. Initially k-NN classifier used to perform the classification. Later, Principal Component Analysis (PCA) and k-NN classifier are used together to extract features of color face images and to simplify the image data. The applications are tested for different color space models and k values. The colour space models are HSV, YCbCr, RGB and YIQ. Finally, experiment results are compared with each other. Based on the mentioned two tables, the classification accuracies of KNN and classification accuracies of PCA and KNN, the increase of k value decreases the classification accuracies. Besides, the change of k value does not affect the classification accuracy in some situations.

In 2015, **S Siddesha et al.[9]** presented a method for classification of raw arecanut. Classification is based on colour attributes. Colour moments and colour histogram along with KNN algorithm is used for classification of raw arecanut. This model uses KNN classifier with four distance measures to examine the impact. Result of 98.13% was obtained using K nearest neighbor having K value as 3 and Euclidean distance measure for colour histogram features. In theoretical approach, accuracy of 20% was obtained.

In 2013, **Sidhanta Kumar Kar et al.[12]** proposed statistical approach for color detection. It begins with the image acquisition and boundary detection of the object is done to distinguish it from the background. The binary values of

#### Motion Detection for Surveillance Systems: A Survey

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**Abstract:** Nowadays, as the terror incidents are reaching a broad bulging peak, the demands on intuitive real-time surveillance systems with one or multiple technologies are rapidly increasing. Commercial spaces, warehouses, universities, and hospitals have had huge impacts and necessitate an embedded mechanism that has the ability to alert and record beside live video of the intruder. The main objective of this study is to improve motion detection timely, based on the low computing systems such as IoT that approximates a desktop or a laptop in terms of functionality and which allows it to be monitored by the owner remotely. This survey paper presents a comprehensive study of the state-of-the-art models and advancement in research that has taken place in the application of motion detection for surveillance systems. Our study shows that even though traditional statistical methods have proven to be effective for motion detection, but with the availability of a huge amount of data in today's world and the recent progress in deep learning has paved a way for highly accurate motion detection systems for surveillance.

**Keywords:** Motion Detection, Surveillance Systems, Computer vision, IOT, Systems Security, Intruder Detection, Automated Security,

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#### I. INTRODUCTION

With the proliferation of computer vision techniques, it has become easier to monitor large surveillant environments. Typically, security personnel had to stay and monitor the surveillance cameras and alert the authority if an intruder was detected. But now in the big picture, we are considering surveillant environments to be terrains where installing physical cameras is near to impossible. One example of such terrain could be the international borders where surveillance is tough due to border tensions. In such cases, an efficient and robust system is required that can detect infiltration and alert the authorities immediately. The demand for an efficient surveillance system is increasing day by day. From a broader perspective, this up-to-the-minute system is very much required in every place where security can be a concern. Moving object detection is one of the major features of such systems, and when we couple it with a pose-estimation model to detect unusual movement of people in the frames, it leads to a futuristic system that can be made efficient to support any terrain or environment.

The operational perspective of any motion detection model can be visualized using the Flow-chart mentioned in Fig 1. Raw input video frames from the surveillance system are pre-processed to clean the video frames to remove any irregularities present in the input. Moving objects are then detected using any image processing methods like background subtraction, frame differencing, temporal differencing, statistical methods or machine learning approaches like artificial neural networks. The post-processing methods can then be applied to provide a motion masked output.

In this survey paper, we have explored various works done in the domain of surveillance using motion detection. We have listed down our findings in sequential order under the Literature survey section.



#### LOAN APPROVAL PREDICTION BASED ON MACHINE LEARNING

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Abstract - The enhancement in the banking sector lots of people are applying for bank loans but the bank has its limited assets which it has to grant to limited people only, so finding out to whom the loan can be granted which will be a safer option for the bank is a typical process. So in this paper we try to reduce this risk factor behind selecting the safe person so as to save lots of bank efforts and assets. This is done by mining the Big Data of the previous records of the people to whom the loan was granted before and on the basis of these records/experiences the machine was trained using the machine learning model which give the most accurate result. The main objective of this paper is to predict whether assigning the loan to particular person will be safe or not. This paper is divided into four sections (i)Data Collection (ii) Comparison of machine learning models on collected data (iii) Training of system on most promising model (iv) Testing.

Key Words: Loan Prediction, Big data, Machine Learning, Logistic Regression, SVM, Decision Tree, Naïve Bayes.

#### **1. INTRODUCTION**

Distribution of the loans is the core business part of almost every banks. The main portion the bank's assets is directly came from the profit earned from the loans distributed by the banks. The prime objective in banking environment is to invest their assets in safe hands where it is. Today many banks/financial companies approves loan after a regress process of verification and validation but still there is no surety whether the chosen applicant is the deserving right applicant out of all applicants. Through this system we can predict whether that particular applicant is safe or not and the whole process of validation of features is automated by machine learning technique. The disadvantage of this model is that it emphasize different weights to each factor but in real life sometime loan can be approved on the basis of single strong factor only, which is not possible through this system.

Loan Prediction is very helpful for employee of banks as well as for the applicant also. The aim of this Paper is to provide quick, immediate and easy way to choose the deserving applicants. It can provide special advantages to the bank. The Loan Prediction System can automatically calculate the weight of each features taking part in loan processing and on new test data same features are processed with respect to their associated weight .A time limit can be set for the applicant to check whether his/her loan can be sanctioned or not. Loan Prediction System allows jumping to specific application so that it can be check on priority basis. This Paper is exclusively for the managing authority of Bank/finance company, whole process of prediction is done privately no stakeholders would be able to alter the processing. Result against particular Loan Id can be send to various department of banks so that they can take appropriate action on application. This helps all others department to carried out other formalities.

#### **2. LITERATURE SURVEY**

In 2019, Vimala and Sharmili [1] proposed a loan prediction model using NB and Support Vector Machines (SVM) methods. Naïve Bayes, an independent speculation approach, encompasses probability theory regarding the data classification. On the other hand, SVM uses statistical learning model for classification of predictions. Dataset from UCI repository with 21 attributes was adopted to evaluate the proposed method. Experimentations concluded that, rather than individual performances of classifiers (NB and SVM), the integration of NB and SVM resulted in an efficient classification of loan prediction.

In 2019, Jency, Sumathi and Shiva Sri [2] proposed a Exploratory Data Analysis (EDA) regarding the loan prediction procedure based on the client's nature and their requirements. The major factors concentrated during the data analysis were annual income versus loan purpose, customer's trust, loan tenure versus delinquent months, loan tenure versus credit category, loan tenure versus number of years in the current job, and chances for loan repayment versus the house ownership. Finally, the outcome of the present work was to infer the constraints on the customer who are applying for the loan followed by the prediction regarding the repayment. Further, results showed that, the customers were interested more on availing short-tenure loans rather than long-tenure loans.

In 2019, Supriya, Pavani, Saisushma, Vimala Kumari and Vikas [3] presented a ML based loan prediction model. The modules in the present approach were data collection and pre-processing, applying the ML models, training followed by testing the data. During the pre-processing stage, the detection and removal of outliers and imputation removal processing were carried out. In the present method, SVM, DT, KNN and gradient boosting models were employed to predict the possibilities of current status regarding the loan approval process. The conventional 80:20 rule was adopted to split the dataset into training and



#### SENTIMENT ANALYSIS OF HOTEL REVIEWS

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**ABSTRACT** - Travel planning relies on user reviews and comments of the hotels on the web. Thus, knowing this data is incredibly important for hotel management. We tend to introduce a platform that collect comments from the user and creates classified and structured overviews of such comments and facilitates access to its data.

**KEY WORDS:** Opinion Mining, Hotel Reviews, Preprocessing, Feature Extraction.

#### **1. INTRODUCTION**

Now a days, a business concern or a service based firm needs feedback from its customers. Increasing of business are requiring for additional variety of services and products. So, the organization should hassle of concerning the reviews, and ratings given by its user to extend the business, as they are required for additional variety of services and products. The service-consumers will mention their feelings and reviews on online-portals. By performing the opinion mining and sentiment analysis on these details we will predict the rating of that organization. One recommender system is required for generating the ratings in precise and correct manner. For a hotel business, reviews regarding numerous aspects like Cleanliness, Maintenance, Behavior, Food, Hospitality, Room neatness, Response from the staff of Hotel, etc. plays a significant role for recommender system. The Customer's feeling with respect to a hotel depends upon the facilities they got from that hotel such as price, location, cleanliness, and facilities of the hotel, services provided by the hotel like laundry, complimentary breakfast, free wi-fi, bar/lounge, babysitting rooms etc. The sentiments can be expressed in the form of excellent, good, average, poor, terrible etc. Basically, the customers want to convey their sentiment with these rating and review.

#### LITERATURE SURVEY

**Lumi lee** from china (2016) enquired and analyzed 72 research paper related to the tourism and hospitality that was published in research journals between January 2008 and December 2015. He analyzed and reviewed the topic-related to characteristic of tourism and hospitality online reviews in different marketing segments and used heuristic systematic model (HSM) to divide and sum up the features that affect consumer's belief in previous HTOR studies. They believed that their suggested ideas will help in the identification of research topic in extended HTORs literature and pointing out possible direction for future studies.

Piang nd bm. (2017) offers a foundation for understanding the operational challenges and recognize several research path for social media analytics in hospitality and tourism area. They comparatively examined information quality related to online reviews on entire hotel population in Manhattan, New York using three major online review platforms which are TripAdvisor, Expedia and yelp through text analytics. The authors state that there exists an enormous inconsistency in the representation of the hotel industry on these platforms. In addition, online reviews differ greatly in terms of their sentiment, semantic features, linguistic characteristic, rating and relationship between the features. A study made an observed analysis to discover the relationship between customer feeling and online customer rating for hotel (Geetha et al., 2017). The researchers considered using the lexicon of positive and negative words used by studies in (Hu and Liu, 2004).

As for the classification algorithm, the researchers utilize **D.kumar** classification technique to use the lexicon of word in order to match words from the document against the lexicon. Then, the classifier assigned the probability of the words being positive or negative. The result of the study finds that there is consistency between customer rating and actual customer's feelings towards the hotel.

**k. Pin Lon and Bhang** (2016) enforced Russian sentiment mining system towards tourism dataset as the evaluation sample. The proposed model was then compare with support vector machine and logistic regression models to compared their performance. As for the result, the projected sentiment model shell the 2 different models with accuracy of 81.3% and F-measure at 81.8%.

**Chang, Ku, and Chen** (2017) state that the real value of social media information is hardly acknowledge because of overloaded information and existing literature in analyzing hotel reviews rarely provides deciding information and promoting insight to enhance business services. The authors projected Associates in Nursing integrated framework consisting of many methods to realize process insight into hotel reviews and rating. The result unconcealed that the projected approach shell baseline algorithm rule with high exactness and recall price that are unit 0.95 and 0.96.

**Divyashree, L, and Majumdar** (2017) used data mining and sentiment analysis techniques to analyses the polarity of the words from the reviews of all hotel on the TripAdvisor website. The studies use the data from Bengaluru Bangalore District Karnataka Hotels dataset containing 6 attributes and



### AUTOMATING ONLINE PROCTORING THROUGH ARTIFICIAL **INTELLIGENCE**

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**Abstract** - In this work, we intend to create a web based automated examination system which can detect any malicious activities and flag them, to ensure fair proposition of exams. Essentially, we detect malpractices by incorporating computer audio and visual movements using webcam and microphone. While it allows students to take a test from any location with specific technical prerequisites, it also removes the need for physical examination centers. Primarily, Vision based tracking consists of Eye ball tracking, Lip movement, Face spoofing, Mobile phone detection, Additional member detection in frame and more. Secondly, the audio-based flagging maps audio to text conversion using Google speech recognition API and also flags if there are high noise disturbances.

#### Key Words: Proctoring, Vision, Online examination, **Malpractice detection, Audio**

#### **1. INTRODUCTION**

Remote examination and proctoring are significantly gaining importance in the wake of accommodation of comfort, security and accessibility. This could not just increase importance for course or stream based examinations but also help in MOOCs and other credit-based certifications for the concern of establishing credibility. Instead of taking examinations in a traditional classroom architecture, now we could lay emphasis on comfort-based learning and verification by means of digital proctoring on a remote basis. According to the UNESCO Educational Disruption and Response to COVID-19 pandemic, most of the governments across the globe are closing down educational institutions and are significantly moving their activity to online and remote modality impacting over 89% of the world's student population. Essential emphasis still remains on accuracy of the models used for proctoring and the depth of analysis that takes place to avoid malpractices in case of remote environment which includes high level analogy of suspicious movement detection and flagging and elimination or hardening false positives until significant accuracy is achieved. While this sort of system invites, multiple detection mechanisms, which could be on fronts of Face detection, Noise detection, Eyeball movement detection, change of tabs detection, Device detection and more, often one or more together could facilitate the fairness of

examination and add credibility and integrity to it, apart from identity verification to avoid non-repudiation.

#### 2. LITERATURE SURVEY

In [1] published by Asep Hadian S. G and Yoanes Bandung, a unique approach is followed wherein user verification is at high importance on a continuous scale. A large dataset of user images is used to train the CNNs to identify the user in low light and general scenarios. They have achieved this by using filters that detect features that must pass non-linear mapping such that the CNN can learn the values. This system is trained during times of lecture for a MOOC or Classroom setup instead of a first-time approach just during exams, which provides leverage to higher accuracy and larger dataset, which in turn eliminates false positives while training the model. The system accuracy rate is measured in the final evaluation stage using false acceptance rate (FAR) and false rejection (FRR) in the verification process.

In [2] presented by Aiman Kiun, emphasis is laid upon fraud detections in video recordings of exams based on Convolutional Neural Networks (CNN), wherein image classification used models were based on usage of Rectified activation units (RAU) which in turn exhibited amazing results for large scale of data sets. Their framework consisted of three parts, (I) An interface, (II) Video processing, (III) Frame classification. The interface necessarily will send the video of the students taking the examination, into a pipeline that consists of a series of methods. The large recording would be converted to minimalistic frames in number and various duplicate or similar looking frames are eliminated as their candidate frames would already be present in the examining set, this will reduce the burden of the proctoring setup, easing down from hours of content to just few hundreds to thousands of frames. The above exhibits typical optimization for burden reduction and efficient analysis in limited resources. The above frames are then sent into a pipeline where, in the second half of the pipeline, these frames are used to train CNNs to identify the normal and suspicious behavior, based on which further flagging mechanism would come into place in accordance with the various policies and rules that are established to perform the distinguishment. This is the entire process that has been followed in the work presented in this paper.

In [3] by Yousef Atoum, there is an additional proctoring check which has introduced a multimedia analysis system which features gaze detection, phone detection, text

### An AI solution for Soil Fertility and Crop Friendliness Detection and Monitoring

#### Varshitha D N, Savita Choudhary

Abstract: Agriculture is the main occupation of India and more than 50% of people are dependent on agriculture. Research on agriculture will strengthen the economic growth of the country. Technologies play a vital role to bolster the agriculture. Since soil is the main fount of agriculture, there is a need for significant approach to help the farmer to test and monitor the soil and its properties ,which will boost the fertility of the soil thereby intensifying the crop growth, also if crop recommendations are imparted to farmers in a proper way, crop yield can be enhanced to meet the growing demand for the food. Proper awareness on soil will benefit the farmers to grow the right and healthy crop. To overcome the disadvantages of traditional soil testing practices we are proposing an approach which has Deep learning, an artificial intelligence(AI) technique and IOT features. This helps in getting fast and accurate result. Soil fertility can be calculated by parameters like pH level, temperature, Moisture content of the soil, temperature, humidity and NPK(nitrogen, phosphorus, and potassium), organic matter, carbon level. Weather and Climatic conditions along with the soil parameters will help to evaluate the soil fertility. The lacking nutrients in the soil and needed nutrients/fertilizers to boost the soil fertility can be suggested to the farmers and also the crops which can be suitably grown from the given soil sample and nutrients required for all the recommended crops to enhance the yield can be suggested to the farmers.

Keywords: Artificial Intelligence, Deep learning, Crop recommendation, NPK, Soil fertility.

#### I. INTRODUCTION

#### **A.Basic Notion**

Agriculture is the biggest economy sector of our India and contributes more to the socio-economic development of India. For more than 50% of Indian population, agriculture is the source to fulfill the livelihood. Farmers strive very hard right from the time they sow to the time they reap. The traditional methods of agriculture need to have modern touch to increase the productivity as to meet the growing population and market. The innovations using technologies are reaching the farmers to serve them in monitoring the crop growth , increase their yield & productivity, hence precision agriculture is the trending field to work for the researchers in India. There are several researches going on across the globe to promote precision agriculture and dwindle the burden of farmers.

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Retrieval Number: 100.1/ijeat.C22700210321 DOI:10.35940/ijeat.C2270.0210321 Journal Website: <u>www.ijeat.org</u> The emerging technologies like IOT, robotics ,Sensor networks, cloud networks, machine learning and many more things are stepping into farmer's life and trying to ease his work. Soil plays a vital role for agriculture, important nutrients in the soil will result in the crop growth. If nutrients are more in soil, more fertile will be the land to grow healthy crops hence more yield will be produced. Soil properties like NPK(nitrogen, Potassium, Phosphorous), pH, moisture, temperature, organic matter, carbon content, humidity along with seasons/weather or climatic conditions and type of soil are important to be considered for plant growth. Maintaining and monitoring soil fertility and its nutrients becomes the prioritized task of agriculture. There needs a lot of researches to enhance the soil fertility and crop prediction practices in Agrarian country like India. The application that has to be developed for soil testing need to be robust, cost friendly and user friendly to reach the farmers. The growing environmental changes have to be taken care to make the application more successful, since there are many ideas proposed the practical implementation is the question of concern. Cost for deployment is also an issue for unsuccessful implementation. There are various research works happening to come up with the solutions for managing soil and to increase its fertility, some are proposed ideas and rest are prototype systems which need to be implemented in future after successful result showcase. Robotic seed sowing and harvesting is already implemented in few countries. Pest control system using artificial intelligence is getting implemented in few places. The work which we have proposed here, is to help the farmers to test the soil sample and let them know what is lacking in it by analyzing soil fertility and what has to be added to increase soil fertility, also this work aims to recommend the crops which can be suitably grown from given soil sample. This is going to help our Indian farmers to understand about the soil in an easier and better way and take further steps to grow crops in an efficient way. This will surely reduce the defective crops and promote healthy crops. There are soil sensors which are available in market which senses the soil and sensed data is given to the system for analysis, Features like PH, Nitrogen, Potassium, Phosphorous, moisture content and humidity are used to find the fertility of soil. Using Deep learning ,a technique of artificial intelligence, the system will be trained in such a way that the soil fertility and its crop friendliness is detected .IOT features along with AI technique will increase the soil testing and monitoring efficiency.

#### **B.**Artificial Intelligence in IT for soil testing







#### **Review on Air Quality Prediction Using ARIMA and Neural Network** Avinash S B<sup>1</sup>, Chaluvaraj M<sup>2</sup>, N V Devanand<sup>3</sup>, Raju H<sup>4</sup>, Mrs. M G Kousar<sup>5</sup>

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Abstract - In recent years, people have been paying more and more attention to air quality because it directly affects people's health and daily life. Effective air quality prediction has become one of the hot research issues. However, this paper is suffering many challenges, such as the instability of data sources and the variation of pollutant concentration along time series. Aiming at this problem, we propose an improved air quality prediction method based on the ARIMA model to predict the PM2.5 concentration at the 35 air quality monitoring stations in Beijing over the next 24 h. In this paper, we resolve the issue of processing the high-dimensional large-scale data by employing the ARIMA model and innovatively take the forecasting data as one of the data sources for predicting the air quality. With exploring the forecasting data feature, we could improve the prediction accuracy with making full use of the available spatial data. Given the lack of data, we employ the sliding window mechanism to deeply mine the high-dimensional temporal features for increasing the training dimensions to millions. We compare the predicted data with the actual data collected at the 35 air quality monitoring stations in Beijing. The experimental results show that the proposed method is superior to other schemes and prove the advantage of integrating the forecasting data and building up the highdimensional statistical analysis.

#### *Key Words*: Instability, Prediction, Employing, Forecasting, Data Sources, Predicted Data, Actual Data. 1.INTRODUCTION

In recent years, people are beginning to pay more and more attention to the impact of the environment on health, and the information related to air quality has become the focus of people's daily life. The existing air quality monitoring instruments, stations and satellite meteorological data can provide real-time air quality monitoring information. However, this is far from sufficient, and it is entirely necessary to predict the trend of air pollutants in the future. Currently, the forecast data on weather conditions is of high reliability and accuracy. Based on this, we propose to fuse the predictive data, i.e., the forecast data on weather conditions, with the available air quality historical data and meteorological data, supported by machine learning means, to explore mining data correlation and build a wellperformed model of predicting the future air quality conditions. This contribution enables an efficient solution to construct a predictive data feature exploration-based air

quality prediction approach with the improved performance. The primary goal of air quality prediction is to predict the concentration of pollutants for a while in the future based on historical air quality data sets, meteorological data sets, etc., such as the work proposed .By learning the previous research results, we found that the existing methods are employing the historical data-based prediction, using some neural networks, such as LSTM proposed in machine learning based solution proposed .Extreme Learning Machine (ELM) in the simple regression methods. However, on the one hand, such the methods failed to make full use of the existing air quality big data for deeply mining the temporal features and statistical data features. On the other hand, the simple regression methods are less efficient in processing high-dimensional big data and cause the performance of the model accuracy relatively limited. It can be seen that the existing methods have some certain limitations and it is necessary to carry out further research. Nowadays, as meteorological data measurements become more accurate and predictive data begins to be highly reliable, it exhibits considerable mining value. If the predictive data can be effectively combined with the historical data, the prediction effect will be significantly improved. Based on the above considerations, this paper selects to employ the model that is suitable for processing high-dimensional data and supporting the parallel learning, namely LightGBM combined with the historical datasets to predict the air quality. With this method, we use the historical air quality data within the latest 144 hours and the future 24-hour weather forecast data to carry out the timerelated feature mining and to construct the relevant statistical features, and then we are enabled to predict the PM2.5 concentration at the 35 air quality monitoring stations in Beijing. After preprocessing the data, we use the sliding window mechanism to increase the feature dimension to 2262 and expand the data volume to millions of items, through which a higher accurate prediction model could be established.

In the process of conducting air quality predictions, we are facing many challenges. First, the air quality is always affected by a variety of factors, such as traffic factors, big events, etc. Such the impact factors are difficult to acquire or model in advance. Second, the air quality exhibits high uncertainty in the time dimension .PM2.5 pollutant concentration values of the given air quality monitoring station at the same moment along the two days is hugely different. Moreover, even during the same day, the PM2.5 concentration value varies a lot, and the difference between the highest and lowest concentration values could reach 100 (mg/m3). Third, the geographical distribution of the air

#### VIRTUAL TRAFFIC POLICE

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**Abstract** -In the new advancing world, traffic rule infringement became a focal issue for major share of the non-industrial nations. The quantities of vehicles area unit increasing quickly even as the quantities of traffic rule infringement per area unit increasing drastically. Overseeing traffic rule infringement has systematically been a boring and commerce off trip. Despite the very fact that the cycle of traffic boards has become mechanized, its associate is exceptionally testing issue, owing to the number of plate styles, numerous scales, turns and non-uniform enlightenment conditions throughout image getting. The key goal of this enterprise is to manage the traffic rule infringement exactly and price viably. The projected model incorporates a computerized framework that utilizes camera to catch video. The task presents Automatic variety Plate Recognition (ANPR) methods and alternative image management strategies for plate confinement and character acknowledgment that makes it faster and less complicated to acknowledge the quantity plates. Inside the wake of seeing vehicle variety from a variety registration plate tags, A SMS based general module is utilized to notify the vehicle owner regarding their infringement or encroachment. An extra message is delivered off to Regional Transport Office's in charge department for following the acknowledgement standing

Key Words: ANPR, OpenCv, neural networks, yolov3, haar cascade, automatic violation detection, deep learning

#### **1. INTRODUCTION**

Mechanization or automation in everyday life has acquired significance in late years. The increase in measure of mishaps on the streets is a cause of the standard infringement like breaking traffic lights, over speeding, driving on wrong sides and so on. To evade such petty criminal offenses, traffic police must be must be constrained to constantly keeping check if some vehicles are abusing or breaking the standard rules and regulations. Certain programmed arrangements were created to dispense with the infringement; however everything about them had sure impediments. For example, the video recording cameras dispensed with the need for partner that is human assistance to identify rule infringement. In any case, the whole video must be checked physically for the standard infringement situation. During this arranged framework, a response for signal breaking infringement is given. The framework incorporates an programmed framework by abuse IR sensor, camera and registration plate identification application. Registration tag recognition applications by mistreated image processing algorithms can recognize the registration plate and SMS will be delivered to an individual simply if there was an occurrence of rule infringement situation. Altogether in all the nations there are square measure driving guidelines open for people to drive exactingly by being straightforward and regarding. When these guidelines square measure broken it's plot as a street infringement. There are street infringement that occur in everyday rush hour gridlock. for example generally run of the mill infringement, for example, red light infringement, crossing the speed limit mentioned on a particular region, reordering elective vehicles through twofold lanes and single lanes. These street conventions square measure applied absolutely for the spots at any place where the vast majority of the mishaps on road occur. Investigation on this led to implementation of assistance with OpenCV and python to principally put together framework with respect to a PC. This strategy is referred to as VIRTUAL-POLICE. This strategy is implemented to facilitate the work of the police utilizing a PC program. Various technologies like image processing innovations are is utilized to distinguish the paths, vehicles and can decide vehicles which defy norms. The working group has executed the framework with the supersonic sensors in order to build a system framework to get conditions to distinguish once an infringement of traffic rules occur. It'll be simpler for the police to get the one who violated the laws of the traffic and also to monitor the police officers who accepting payoffs which are unlawful and deceptive people will be diminished. A picture of the infringement with the location, time, date and a image of the vehicle will be shared to the nearest police officers gadgets by etymologizing gadgets round the current area where infringement occurred.

#### 2. LITERATURE SURVEY

[1]Author: A Wibisono, I Sina A, W Jatmiko, Nurhadiyatna, B Hardjono, Year: 2013. Abstract: This proposed framework says we can utilize not many techniques to recognize and appraise vehicle speed in the dark by utilizing CCTV Camera. Vehicle identification calculation was utilized and implemented using vehicle detection algorithms. This technique gives better discovery precision than the strategy which involves in calculating the difference between the area centroids.



#### Age and Gender Detection using Deep Learning

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**ABSTRACT** - Automatic age and gender classification has become more useful as there is increase in number of applications, especially since the increase of use in online platforms and social media. In spite of that, execution of actual software technique on real-world images is still not so accurate due to lacking in upgradation, especially when compared to uses in recent covid-19 pandemic for face recognition and other tasks. In this paper we show that learning face recognition through deep learning and convolution neural network(CNN), a gradual increase in performance can be obtained on these tasks.

#### Key word - convolution neural network(CNN).

#### **1. INTRODUCTION**

Age Recognition model may be used for categorization data in companies collecting information about people (such as model or recruiting agencies), for forming selection of respondents during social science researches, for verification users of dating services, social media and other services which require confirmation of age. A new study by the NIST revealed dramatic biases in the facial recognition software when it came to identifying the people of color. According to the study which they made says, there was increase in false positives when the study ware made between two people where one was from Asian and another one was from African American, this people face ware compared with Caucasian faces. And this effect was exceptionally dramatic as in some case as there was misidentifications 100 times more for the people who are actually from Asian and African American compared to the people who are white in skin color.

It also says that the facial recognition software and algorithm developed in Asian countries are less likely to misidentify people of color. This clearly shows that there is effect of the diversity of existing data, or scarcity, on the resulting method.

#### 2. Literature Survey

Yunjo Lee (2011), proposed a methodology, that the fMRI method is one of the efficient way to analyses and determine the age of the people around us. The study includes recording of different aged people according to there gender, height and other characteristics. The brain activation tasks which are related to face matching are performed and tested outside the scanner. After analyzing all data there was no change in existing result in face processing in older as well as young adults. The result remain same in the people who are having same face viewpoints. The aging of the people who are higher in age ware not based on single factor. It is combination of various constituent which are taken by gathering all the data that result in contributing some genuine reason to such results. The results which we get at end should be analyzed by comparing all required credentials so that it can be used in certain environment.

R. Begg (2006) proposed a methodology, that the aging through the artificial neural networks will change the walking by using automatic recognition is the aim of the article. The balance control of the locomotors system will get disturbed due to the manner of walking which are caused through patterns which are generated according to the increasing age. There are many good reasons to use such techniques. The first one was standard back propagation and second one was scaled conjugate gradient and last one was back propagation with the help of Bayesian regularization ware three methods used. The three networks came out with improved results but from above all methods Bayesian regularization method was the one of the better methods which gave greater result in some of the fields. The neural networks thus are a one of the best method to find age identification process.

Hang Qi (2009) proposed a methodology, that various techniques coming into force for detection of face which can be further used to get age of the required person. Here, an (AS) which is also called as automated system has been suggested which can classify the age and help differentiate kids face from that of adults and elders one face. There are three steps which are used in this method. First one is detection where the input is persons face and second one is face alignment which is used to find the geometrical structure of human faces and third one is normalization. Face samples are taken from normal face detection and alignment method. ICA is used to extract basic facial components from the inputted faces. This system is better and faster. Results which are gathered from this process are efficient.

Kensuke Mitsukura (2003) proposed a methodology, that by analyzing the color information the threshold value In multivalued images is considered. There is lack of information when there is no major changes in threshold of an image. Whenever there is external influence of any light vary, the data of the color varies. It becomes important to decide the face. It is not easy to determine the face division standards. This is done to provide the required information to the genetic Algorithm used in the method. Face decision method is suggested further which can be used to determine whether

### A Review on Rainfall Prediction using Machine Learning and Neural Network

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\*\*\*\_\_\_\_\_\_ Abstract - In India, agriculture is the most important factor for survival of human being. For agriculture, the most important thing is water. i.e., rainfall. Nowadays rainfall prediction is a major problem. Predicting the amount of rainfall gives alertness to farmers by knowing early so that they can protect their crops and properties from rain. There are more techniques to predict the rainfall. The ML algorithms are best suited for prediction of rainfall. Here are some of the major ML algorithms used rapidly which are Auto regressive integrated moving average Model (ARIMA), Artificial neural network (ANN), Support Vector Machine, Logistic regression, and Self organizing map. And there are two models commonly used to predict periodic rainfall such as Linear and Non-linear models. ARIMA Model is the first used model. Although using ANN (Artificial neural network) the prediction of rain can easily completed by using Cascade NN, Layer recurrent network, or Back propagation NN. Artificial NN is similar as Biological neural networks.

Key Words: Machine Learning, LASSO regression, ANN(Artificial Neural Network) approach, ARIMA MODEL(Auto Regressive Integrated Moving Average), Naive Bayes.

#### **1. INTRODUCTION**

Nowadays, rainfall is considered to be one of the most liable factor for most of the significant things in the world. In India, agriculture is one of the most important factor in deciding the economy of the country and agriculture is totally dependent on the rainfall. Apart from agriculture, rainfall is also more important in coastal areas around the world by getting to know the rainfall is very much necessary to protect their life's from the floods and heavy rainfall. In some of the areas which are having drought, to establish an rainfall harvester, proper prediction of rainfall is necessary. In this project we are dealing with

predicting of rainfall using Machine learning and Neural networks. In this, we are executing an comparative study of machine learning approaches and neural network approaches then accordingly selects the perfect approach for prediction of rainfall. First the preprocess is performed, i.e. representing the input dataset in graph form. Such as histogram, bar graph etc. In ML techniques, LASSO (Least absolute shrinkage and selection operator) regression is used and ANN (Artificial Neural Network) approach is used for neural network. After the calculation, accuracy and errors of the LASSO and ANN is been compared and accordingly the conclusion is made. In this, the prediction of rainfall is made with the approach which has highest accuracy in the outcomes. The prediction of rainfall is done with the dataset which has the information related to rainfall.

#### **1.1 MOTIVATION**

Predicting rainfall is an application of science and technology for predicting the amount of rain over an area. The most important thing is to accurately determine the rainfall for active use of rainfall for water resources, crops, pre-planning of water resources and for agricultural purposes. In earlier rainfall information benefits the farmers for better managing their crops and properties from heavy rainfall. The farmers better manage to increase the economic growth of the country by efficient rainfall information. Prediction of precipitation is necessary to save the life of people's and properties from flooding. Prediction of rainfall helps people in coastal areas by preventing the floods.



#### **REAL TIME EYE BLINKING FOR PASSWORD AUTHENTICATION**

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Abstract - alpha numeric passcode are wider used for the process of authenticating a user accessing system. alpha numeric pass code authentication requires using unique Id's that require users Id's through this process can easly crack the unique Id's or shoulder surfing and also thermal tracking unique Id's authentication with hand-off are blink password entry technique on the other side no foot prints behind and these provide. Enter option eye blind based password authentication referring to find the eye blink across the sequentially process the image frames and generate the numeric passcode. Our project represent the RTA to combine eye blink-based password entry and face detection and one time password(OPT) to avoid shoulder suffering.

#### Key Words: Machine Learning, Classification algorithms, proposed system, HARR cascade face detection, local binary pattern histogram Prediction and classification

#### **1. INTRODUCTION**

Security is the general process of verifying the identity of the person. This process should be faster, high accuracy and secure. User must be authenticated them self everyday using conventional approach like password but this technique are dangerous because this approach can be observed by the hackers who uses the Different skills such as hacking of the personal data and also corrupting users personal data and also these are many security issues due to lack of communication between the system and user. As their result to overcome this problem the research proposed three layer security process to secure unique Id's. Where the user allowed to enter pin through blinking eyes at the suitable pin through this method can avoid the shoulder surfing. Eye blink passcode authentication provides the good solution to provide security for the system. Main aim of this project is to provide security through eyeblink authentication system

#### **1.1 MOTIVATION**

The use of alpha numeric pass code or personal Identification process are widely used by the users such as money management system in automatic teller machines(ATM's).online transactions, unlock Smart phones, opening doars. These PIN's are majorly used to secure personal data, authentication will be always the challenging part even using the pin authentication. According to Indian RBI Bank the number of incident of ATM fraud has increased from all cases in 2017-2018 to 980 cases in 2018- 2019. The fact the authorized person should enter the PIN

authentication code in the public places this make pin entry In Peril to password attack. Such as thermal tracking and Shoulder surfing. So we have motivated to implement the real time eye blink password based authentication system to avoid major problems.

#### 2. RELATED WORK

#### Secured PASSWORD-Entering Against Human Shoulder-**Surfing Activity:**

When customers enters their pins or passwords in a croweded area, his passwords may steeling by someone. The entered pin be able to seen by someone more successfully in a overcrowded places. So a new Method has been invented to overcome this issue known as Cryptography Prevention Strategies. The original BW method is used to protect the human shoulder surfing invasion. In each time, a keypad is coloured at odd, the particular person who have the PIN can only login By pressing the specified colour keys. The IBW method is checked to be secret against human nemesis due to the imprison cognitive abilities of humans. Also the IBW technique it has been proven against any hacking attack [1].

#### **Gaze-Based PIN Checking using Automatic Clustering of Gaze Points Performance:**

Researchers have proposed an eye follower for users to enter PINs by seeing the particular text on the computer screen. This visualization technique is deterrent to the study of shoulder surfing: Key users' keystrokes are secretly tracked while inserting the PINs on the keyboard. In this paper we express the identification system for users to verify their PINs by

seeing at the icons on the on-screen keyboard. Currently eyetracking based authentication techniques asks the customer to enter a trigger when seeing at each symbol. alternatively, in Eye Dent, viewpoints are dynamically clustered to determine the user's viewed texts; This method has the advantage of accepting users to focus on their normal speed Fixed dwell time. Additionally, without visible trigger couldn't reveal the number of texts in the PIN. Preliminary investigation outcome point out that rapid (3 sec per 4 digit password) By Using This Project Visualization is possible, but to compute the calibration error more tasks is required[2].



A Erfordert eine Authentifizierung | Veröffentlicht von **De Gruyter** | 22. April 2021

### Deep convolutional neural network for chronic kidney disease prediction using ultrasound imaging

Smitha Patil 🖂 und Savita Choudhary

Aus der Zeitschrift Bio-Algorithms and Med-Systems https://doi.org/10.1515/bams-2020-0068

Citations 6

#### Abstract

#### Objectives

Chronic kidney disease (CKD) is a common disease and it is related to a higher risk of cardiovascular disease and end-stage renal disease that can be prevented by the earlier recognition and diagnosis of individuals at risk. Even though risk factors for CKD have been recognized, the effectiveness of CKD risk classification via prediction models remains uncertain. This paper intends to introduce a new predictive model for CKD using US image.

#### Methods

The proposed model includes three main phases "(1) preprocessing, (2) feature extraction, (3) and classification." In the first phase, the input image is subjected to preprocessing, which deploys image inpainting and median filtering processes. After preprocessing, feature extraction takes place under four cases; (a) texture analysis to detect the characteristics of texture, (b) proposed high-level feature enabled local binary pattern (LBP) extraction, (c) area based feature extraction, and (d) mean intensity based feature extraction. These extracted features are then subjected for classification, where "optimized deep convolutional neural network (DCNN)" is used. In order to make the prediction more accurate, the weight and the activation function of DCNN are optimally chosen by a new hybrid model termed as diversity maintained hybrid whale moth flame optimization (DM-HWM) model.

#### **Chatbots: Cross-Domain Engineering Application**

Turkish Online Journal of Qualitative Inquiry (TOJQI Volume 12, Issue 6, July, 2021: 8414 -8424

Research Article

#### Chatbots: Cross-Domain Engineering Applica

Ajay Sudhir Bale<sup>1</sup>, Subhashish Tiwari<sup>2\*</sup>, B C Hemapriya<sup>3</sup>, Subraman Chithra R<sup>1</sup>, Nithin Gowda N<sup>1</sup>, Dixit Shetty<sup>1</sup>, Ravindra V<sup>5</sup>, M Kaush Ramasamy<sup>7</sup> Abstract

This paper overviews the cross-domain engineering applications c powerful software built using artificial intelligence and machine learnin to user input data and have impacted a wide range of working fie journalism, and finance. In Journalism, chatbots mean the r communication, spreading awareness more effectively among the y Healthcare systems, chatbots prove to be extensively useful in emer symptoms for individual patients can be difficult, but having s personalized data, chatbots can predict quite accurately what problem t – including chronic illnesses. In Finance, chatbots are used to custom based on factors like age which vary their intention of using their a stability. Further research on chatbots will thus prove to enhance their like these where they have immense potential.

Keywords- Healthcare, Finance, Journalism, Growth, Restrictions.

#### I. INTRODUCTION

The Chatbot is a word contracted using two words Chat and I derived from robot. Chatbots are intelligent software that reacts information [1-5]. In recent years chats bots are built above the mo artificial intelligence and machine learning, showcasing the impressive a natural humanistic response. However, with the advanced develop processing (NLP), chatbots are also integrated with voice-to-voice result. There are many applications of chatbots in the field of manufact.

#### **Chatbots: Cross-Domain Engineering Applications**

Turkish Online Journal of Qualitative Inquiry (TOJQI) Volume 12, Issue 6, July, 2021: 8414 -8424

Research Article

#### **Chatbots: Cross-Domain Engineering Applications**

Ajay Sudhir Bale<sup>1</sup>, Subhashish Tiwari<sup>2\*</sup>, B C Hemapriya<sup>3</sup>, Subramanya S G<sup>4</sup>, Vinay N<sup>1</sup>, Baby Chithra R<sup>1</sup>, Nithin Gowda N<sup>1</sup>, Dixit Shetty<sup>1</sup>, Ravindra V<sup>5</sup>, M Kaushik<sup>6</sup> and Anandhakumar Ramasamy<sup>7</sup>

#### Abstract

This paper overviews the cross-domain engineering applications of Chatbots. Chatbots are powerful software built using artificial intelligence and machine learning algorithms that respond to user input data and have impacted a wide range of working fields, including healthcare, journalism, and finance. In Journalism, chatbots mean the rise of interactive news communication, spreading awareness more effectively among the younger generation. In the Healthcare systems, chatbots prove to be extensively useful in emergencies where identifying symptoms for individual patients can be difficult, but having stored a vast amount of personalized data, chatbots can predict quite accurately what problem the patient might be facing – including chronic illnesses. In Finance, chatbots are used to customize responses to each user based on factors like age which vary their intention of using their account to secure financial stability. Further research on chatbots will thus prove to enhance their efficiency in several fields.

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### International Journal of Control and Automation



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## Detection of 3 – Dimensional Superficial Landmarks by using Deep Neural Networks

Shagun Gupta, Shubham Mahajan, Anil Kumar Bhardwaj, CH. Vanipriya, Amit Kant Pandit

#### Abstract

Different functions are developed for superficial research to help acknowledgment of individual qualities, examination of race, individual confirmation for security business and another research fields. Accordingly, it's conceivable to distinguish the distinctions fit as a fiddle dependent on spot of nation and birth. Present examination dissects superficial shape utilizing checked three dimensional superficial pictures and researches approaches to remove superficial tourist spots from the three-dimensional superficial pictures. The location of the superficial milestone requires standardization of superficial scale and position in three-dimensional picture information to break down the superficial shape. In this manner, it's hard getting exact superficial milestones from three dimensional superficial pictures. Our technique breaks down the undertaking into the accompanying three sections: (a) transformation of information from the three-dimensional superficial picture to a two-dimensional picture, (b) extraction of superficial milestones from the three-dimensional picture to a two-dimensional picture, (b) extraction of superficial milestones from the three-dimensional picture structure utilizing Convolutional Neural Network (CNN) (c) reversal of distinguished superficial tourist spots two dimensional to three dimensional pictures. In tests, analyzes the exactness of superficial milestone recognition model.

🔒 PDF

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Performance Evaluation of Laser Based FSO Communication System in Turbulent Atmosphere

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#### ABSTRACT

Laser based Free-space optical communication (FSO) is evolving as one of the key advancements in multi giga byte wireless communication. The turbulence in the atmosphere is the major degrading factor of FSO link. The weak atmospheric turbulent channel capacity of the link has been evaluated using the log normal distribution model. The performance of this model is evaluated based on refractive index turbulent strength parameter, link parameters such as length, operational wavelength of the input signal at the transmitter, receiver aperture and Scintillation Index. The closed form of average capacity of the channel has been derived and the capacity of FSO channel is measured at various turbulence levels. Subcarrier Intensity Modulation/SIM BPSK modulation technique is used in FSO link and error performance is evaluated.SIM BPSK modulation shows better performance as compared to NRZ-OOK in weak atmospheric turbulence.

**Key words:** Log Normal distribution, Free Space Communication (FSO), refractive index structure parameter, SIM BPSK Modulation.

#### 1. INTRODUCTION

Free space optical communication (FSO)or optical wirelesscommunication, has become a well-known research subject in the present business and technical front because of the financial affordability, permission free and high data transmission rates. This rising innovation shows up as a promising expansion to earthly communication applications in contrast to its RF counterparts. Because of its small transmit beam range, the FSO transmission offers LOS connectivity and operates in both visible and IR ranges [1]. The essential rule of FSO employs line-of-sight communication technique.

FSO communication system is preferred over the Radio Frequency counterparts. This is significantly because of the contrast in the transmission bandwidth. For FSO communication the atmospheric transmission range lies at par with the infrared bandwidth run from "700 nm to 1600nm". The transmission range for radio frequency signals lie between 30mm to 3 m. This huge proportion of wavelength prompts some intriguing contrasts between them such as huge modulation bandwidth, narrow beam divergence, low power consumption, high data rate, licensefree spectrum and high security. Adding to these advantages, FSO links are readily expandable while eliminating network size, small sized and light weighted. Also, FSO links can be easily and quickly deployed in places where optical fibres cannot be used [2].FSO communication provides a usable bandwidth which is10<sup>5</sup>times more as compared to the RF counterparts. There is also an increase in the power received at the receiver in case of FSO systems due to the usage of narrower bandwidth. The narrow beam divergence of FSO systems has resulted in small size, light weighted and low power consumption systems. Hence, designers have the flexibility to design smaller systems having higher gain margin at a very affordable initial setup cost and reduced development time. FSO systems also provide license-free transmission and thereby, can be deployed in places where laying of optical fibres is practically not feasible. This also reduces the network size along with ready expandability [3].

FSO technology uses the atmosphere as a proliferating medium whose attributes are influenced by the weather and geographical location of the place, snow, rain, clouds, haze, fog, etc. The difference in the wavelength of the atmospheric particles and that of wavelength used in FSO communication systems leads to scattering phenomenon. These deteriorate the strength of the optical signal and act as a limiting factor for the deployable link distance. This leads to absorption and scattering [4]. The challenge for the FSO communication is turbulent induced fading or scintillation. Scintillation is due to non-homogeneities in the pressure and temperature of the atmosphere along the optical path. Therefore, for the reliable optical path this atmospheric turbulence plays an important role. Turbulence fading can be statistically modelled by "Log normal, Gamma-Gammaand Negative exponential models". Log - Normal model is widely accepted for weak turbulence in the atmosphere [5].

#### 2. LOG-NORMAL WIRELESS OPTICAL CHANNEL MODEL

Estimation of the average feasible optical wireless channel capability due to signal amplitude variations and atmospheric turbulence can be calculated and based on the SNR value, atmospheric turbulences ranging from weak to moderate log-normal distribution model can be employed [5].



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Volume 6, Issue 1, June 2021

### Wind Turbine Power Calculations Using MATLAB-SIMULINK

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Department of EEE Sir M. Visvesvaraya Institute of Technology, Bangalore, Karnataka, India

**Abstract:** In this paper modeling and simulation has been studied by means of impact of energy generated by using wind turbine. The strength conversion primarily depends on the wind velocity and swept area. When design wind structures it's very important to recognize predicted electricity and electricity output for calculating financial viability. Wind turbine performance depends on wind speed, air density, air pressure, temperature and length of blade. The modeling and simulation method is used to analyze the overall performance of wind turbine.

Keywords: Wind Turbine, Wind Speed, Tip velocity ratio (TSR), air pressure, and air temperature

#### I. INTRODUCTION

Wind turbine has changing wind electricity in to electrical energy. Wind mills are classified based on their axis in which they rotate horizontal axis and vertical axis. Horizontal axis turbine has to regulate pitch perspective of blade and to avoid wind storm. The maximum amount of wind power can be collected for the the day. Horizontal axis turbine is regarded more familiar and more frequent than vertical axis [1]. To exploiting wind energy the properties of wind is very important. Wind Speed variable in place to place, seasonal and in hourly means. The turbulence of wind is superimposed, to study the wind strength affection into a wind turbine it is very vital to be aware of mean wind velocity decided by way of the seasonal, synoptic and effect on weather and climate, which varies on a time [2, 3].

#### **II. PROBLEM STATEMENT**

In this paper rated wind speed condition to calculate power produced in wind turbine. To be aware of Energy produced due to special sorts of wind turbines in exceptional conditions. Wind turbine produces extra energy with minimum wind speed or vice versa.

#### III. MATHMATICAL MODELING OF WIND TURBINE

Performance of wind turbine characterized by3 indicators via Power, torque and thrust varying with wind speed. Determines power based on amount of power captured through the rotor, torque is determined based on the size of the gearbox, the structural format of the tower depends on the rotor thrust. Power captured by wind turbine from the moving air and converted it into electrical energy. The parameters that affect captured energy are Air density, power coefficient, air density and swept area of turbine.

The power available in the turbine as proven in the following equation:

$$P_{avail} = \frac{1}{2} \rho C_p V^3 A$$

(1)

To obtain the maximum power to performed from an perfect rotor with infinite blades from wind below best prerequisites is 0.5926 times of the energy handy in the wind as proved by way of scientist Betz and this limit is regarded as the Betz limit. Wind farm are always designed to 2 or 3 blades because design and cost considerations, and hence, the amount of power is approximately half the power available.

Wind turbine tip speed ratio (TSR)  $\lambda = \frac{Blade Tip Speed}{Wind Speed}$ 

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#### AUTOMATION OF GAS TUNNEL KILN USING RELAY LOGICS AND VARIABLE FREQUENCY DRIVES

💄 K. MAHESH 🎴 ; 💄 S. INBASAKARAN ; 💄 J. LITHESH ; 💄 S. PRAVEEN

Asian Journal of Current Research, Volume 5, Issue 1, Page 17-24

Published: 31 July 2020

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#### Abstract

Automation is one of the major concerns in any industry today. Automation is encompassing virtually every Walk of life required right from agricultural to space technology. Plant Automation is the necessity for the Manufacturing industry to survive in today's globally competitive market .It relates to the working of the system at all times without any human intervention. In this paper we are designing a control circuit for the automation of Gas Tunnel Kiln (GTK) using relay logics and Variable Frequency Drives (VFD's) because the present doors and the movement of the transfer car in and out of the kiln are being operated manually and the temperature of the kiln is very high and hence manual operation is not



#### **RESEARCH ARTICLE**

#### **RECYCLING OF BALLASTIC CIRCUIT TO FORM A NIGHT LAMP**

#### Mahesh K., Abhijith V. Narayan, Biswadeep Moitra and Ashish Yadav

# Manuscript InfoAbstractManuscript HistoryThis paper presents a single-stage high-frequency full-bridge electronic<br/>ballast circuit of a scrap CFL is reused for luminance LCD projector<br/>systems. The studied electronic ballast is found to have high conversion

*Key words:-*Ballastic Circuit, Cfl, Full Wave Bridge Rectifier, Snubber Capacitor, Led

Published: August 2020

This paper presents a single-stage high-frequency full-bridge electronic ballast circuit of a scrap CFL is reused for luminance LCD projector systems. The studied electronic ballast is found to have high conversion efficiency due to its single-stage circuit with zero-voltage switching features. A high-power factor can be achieved by using developed single-stage topology. The operation principles and design considerations are analyzed and discussed in detail. The night lamp circuit presented in this paper uses a serviceable electronic circuit enclosed in a base of 11-watt or 15-watt CFL.

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#### Introduction:-

Compact fluorescent lamp (CFL): "A compact fluorescent lamp (CFL), also called compact fluorescent light, energy-saving light, and compact fluorescent tube, is a fluorescent lamp designed to replace an incandescent lamp; some types fit into light fixtures formerly used for incandescent lamps. The lamps use a tube which is curved or folded to fit into the space of an incandescent bulb, and compact electronic ballast in the base of the lamp" [1] as shown in Fig 1.

.....

"Compared to general-service incandescent lamps giving the same amount of visible light, CFLs use one-fifth to one-third the electric power, and last eight to fifteen times longer. Like all fluorescent lamps, CFLs contain mercury, which complicates their disposal" [1]



Fig.1:- Practical view of CFL.



#### Design of Single Inductor and Two Output DC – DC Converter

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#### ABSTRACT

Article Info Volume 7 Issue 6 Page Number: 54-59 Publication Issue : November-December-2020 A DC-DC converter is used to convert from one DC voltage level to another DC voltage level. The output voltage may be increased or decreased when compare to the input voltage based on the circuit topology. DC – DC converters are mainly used as a regulated and isolated power supplies in many applications. Regulated dc power supplies are needed for most analog and digital electronic systems. Most power supplies are designed to meet some or all of the following requirements:

**Regulated output:** The output voltage must be kept constant with respect to the change in output loading.

**Isolation:** The output may be required to be electrically isolated from the input.

In addition to these requirements, common goals are to reduce power supply size and weight and improve their efficiency. A few applications of DC-DC converters are where 5V DC on a personal computer motherboard must be stepped down to 3V, 2V or less for one of the latest CPU chips; where 1.5V from a single cell must be stepped up to 5V or more, to operate electronic circuitry. The main focus in this paper is to generate dc voltage from a one level to other level with minimum loss. The need for such converters has risen due to the fact that transformers are unable to function on dc. Keywords: Single Inductor, Two Output, DC – DC Converter.

#### Article History

Accepted : 10 Nov 2020 Published : 19 Nov 2020

#### I. INTRODUCTION

#### Multi-output DC-DC Converters:

There are many developments in the field of DC-DC converters in recent years in order to reduce their size and increase their efficiency. Many devices like laptops, cellular phones etc. require multiple outputs from a single input. Conventionally, for this purpose

transformers are used with multiple secondary windings as individual outputs, but these have the disadvantages of increased size and weight especially for portable device. A single inductor multi-output converter is one such approach of reducing the effective size and weight of the converter. But it has voltage regulation problem, i.e. if the load changes in one output the other outputs are also affected, so a

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### SIMULATION MODEL OF ELECTRIC VEHICLE TO GRID TECHNOLOGY FOR BALANCING LOADS AND FREQUENCY REGULATIONS

Dr. C V Mohan Assoc. Professor EEE Department Sir MVIT., Bangalore

Abstract-- The Electric Vehicle to Grid Technology is the emerging and promising field for the future of sustainability, as it offers balancing of the grid systems using a source of energy from the Electric Vehicles. This paper presents a bi-directional flow of energy between a fleet of Electric Vehicles and the grid. This technology proposes a method of balancing of loads and frequency regulation by integrating the Electric Vehicle with the renewable energy sources such as solar array and wind farm and the diesel power plant is used as the base plant. It further discusses about the new trend of using Electric Vehicles for balancing of grid systems and enhanced use of sustainable energy and benefits of owning an Electric vehicle thus contributing to the economic benefits in the business models in energy industry. The simulation for 24hrs is carried out and the resultant graph pattern based on the irradiance on the solar panel and the wind speed is obtained and the state of charge of the Electric Vehicle batteries is further observed.

Key Terms-- Electric Vehicle, frequency regulation, grid technology, load balancing, renewable energy.

#### I. INTRODUCTION

Electrical energy is the most essential part of our life. Electricity can be generated using conventional and nonconventional resources in the present days. Without electricity lives on this planet is unimaginable. For all our tasks to be completed these days electricity is the main requirement. Energy production and distribution are continuously growing with the development of increasing volumes of renewable energy sources, which are constantly pushing the energy efficiency limits. With stringent legislation, environmental awareness and rising gasoline prices, Electric Vehicles (EVs) are presented as a promising green solution to reduce emissions and fuel consumption for the automotive industry. EVs can also be used as versatile loads in smart grid applications such as electricity sources, energy storage systems or charging Liu Chunhua et.al (2013).

To effectively utilize the full potential of EVs as a flexible grid-connected energy tool, EVs can be operated not only to charge, but also to transfer energy back to the grid at appropriate times. This is called as Electric Vehicle to Grid Technology. It is the bi-directional flow of electric Deepthi R, Akshay H, Vineeth G D, Srikanth S, Student EEE Department Sir MVIT. Bangalore

energy between the vehicle and the electrical grid. The Electric Vehicle to Grid Technology incorporates the ability to convert the vehicle into a Distributed Energy Resource (DER) that has the potential of integrating with micro grids. In addition to the low carbon future that Electric Vehicle to Grid Technology supports, it also introduces the consumer's prospect of financial incentives, grid frequency offering the bv regulation and load balancing. By participating in balancing of loads and frequency regulation, the system is able to perform day to day scheduling charging/discharging to reduce the cost of ownership of the EVs Amamra Sid-Ali et.al (2019). The existing Electric Vehicle to Grid Technology principles include the incorporation of intermittent renewable energy into the grid, reducing peak load, optimizing charging and regulating participating power. In this paper we will further discuss about how to the balancing of load and frequency regulation is done by integration of renewable energy and Electric Vehicles.

#### II. METHODOLOGY

- The grid is divided into the following four parts: A diesel generator which acts as a 15MW base power generator; an 8MW photovoltaic farm which is combined with a 4.5MW wind farm is used to produce renewable energy; an Electric vehicle to Grid Technology system installed next to the last part of the system which is the load of the grid as shown in Fig.1
- The diesel generator serves to balance the power consumed and the power generated. Grid frequency deviation can be determined by looking at the rotor speed of the synchronous machine's. When the demand is more, then the load on the diesel generator is increased to meet the demand.
- The energy produced by the PV farm depends on three factors: the area covered by the PV farm, the efficiency of solar panels and the data based on the irradiance.
- The wind farm produces electric power, this power follows a wind liner relationship. The wind farm produces nominal power when it reaches the nominal velocity. When the wind speed reaches the average wind value, the wind farm trips from the grid before the wind returns to its nominal value.
  - The voltage from the generation units is stepped up

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### **Design Of a Prototype Wireless Power Transmission System for A 50W Load**

Ms. Bindiya Tyagi, Abhav S Velidi, Yogesh Raju N R

Asst. Professor, Student, Student Electrical And Electronics Department, Sir M Visvesvaraya Institute of Technology, Bengaluru, India

*Abstract:* The proposed paper discusses on the possibilities of transmitting power wirelessly over certain small distances for a load of 50W (maximum 75W). The system consists of mainly five blocks namely: AC-DC rectifier, DC-AC high frequency inverter, resonating circuits, DC-AC high frequency rectifier and a closed loop buck converter. This particular system is designed to operate in the radio frequency bandwidth of 25kHz to 150kHz. The system is designed keeping in mind applications such as very low power electric cycle and laptop chargers. This concept can be extended for mid-range WPT systems mainly wireless EV charging by changing few devices.

#### Index Terms - WPT, PTC, DC-AC High Frequency Inverter, Buck Converter, Wireless EV Charging.

#### I. INTRODUCTION

The technology for wireless power transmission or wireless power transfer (WPT) is in the forefront of electronic development. The main function of wireless power transfer is to allow electrical devices to be continuously charged and overcome with the constraint of a power cord. In day-to-day life many applications are witnessed which are powered using tangled wires. The concept of wireless power transmission has been there since 1886. Hertz performed experiment with pulsed wireless energy transfer, he produced an apparatus that produced and detected microwaves in UHF (ultra-high frequency) region. Tesla also performed experiment in the field of wireless energy transfer in 1899.

WPT system is a very necessary field of research as this technology can be extended to many devices in day-to-day life to make life comfortable. To understand in a better way let us consider two coils namely transmitting coil Tx and receiving coil Rx which send and receive power on the principle of mutual inductance. As stated by Faraday when current passes through a conductor magnetic field is created which surrounds the conductor. Similarly, the varying current during the transmission time produces time varying magnetic field. When this magnetic field cuts another conductor, an EMF is induced into the conductor. This phenomenon is known as Faraday's Law of Electromagnetic Induction.

In a wireless power transmission system, a transmitter device driven by electric power from a power source generates a time varying EM (electromagnetic field) which transmits power across space to a receiver device which in turn converts the electrical energy into desired form. Wireless power transmission mainly falls into two categories namely near field and far field. This paper focuses on near field or non-radioactive power transfer technique using inductive coupling between coils of wire at a frequency of 130kHz

#### **II. LITERATURE SURVEY**

#### 2.0 EXISTING SYSTEM

The existing WPT systems are used to charge mobile phones whose voltage rating is very small and total power output is also, less. The extension of WPT for mid and high range power is still under research. This manuscript will help and explain in designing a WPT system for a load of 25V, 50W (Maximum 75W).

#### 2.1 PROPOSED SYSTEM

This paper is an attempt to design a WPT system which is powered using 230V, 50Hz single phase AC. This system can be used to power a maximum load of 50W keeping the frequency fixed at 130kHz (which can be varied from 25kHz to 150kHz).

This system comprises mainly of five blocks as seen in Fig 1.0. The first block is the rectifier block which converts the input single phase AC voltage to DC. The second block is a high frequency inverter which converts our DC to high frequency stepped AC, which is significant to achieve wireless transmission. The third block comprises of resonating circuits and their corresponding transmission and receiving coils. The fourth block is a high frequency rectifier circuit which converts high frequency AC to DC. The last block is the closed loop buck converter which converts DC voltage to lower value of DC voltage.



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## Influence of process parameters on tensile strength and hardness of AW2024/B<sub>4</sub>C composite using Taguchi's technique

L. Bharath <sup>a b</sup> A M. Sreenivasa Reddy <sup>b</sup>, H.N. Girisha <sup>c</sup>, G. Balakumar <sup>d</sup>

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https://doi.org/10.1016/j.matpr.2021.04.308 A Get rights and content A

#### Abstract

The need for <u>engineering materials</u> in the aerospace industry is increasing day by day. AW2024 alloy with boron <u>carbide particulates</u> will suit specific applications like aircraft structure, window panel, seats, aircraft fittings, and wheels. Hence in this research paper, AW2024 alloy was selected as the matrix and boron <u>carbide particulates</u> as reinforcement. Boron carbide particles with three different mesh sizes have been chosen and varied in wt% into the AW2024 matrix routed through stir casting process. Taguchi's Technique was used to evaluate optimization, S/N ratio, influence of process parameters, and regression equation to validate the experimental values. It was noticed that <u>tensile strength</u> and hardness were found to be improved with an increase in wt% of boron carbide particulates in the AW2024 alloy. SEM images show that boron carbide particles are uniformly distributed in the AW2024 alloy and dimple structures were formed at the tensile fracture surface.

#### Introduction

Metal Matrix Composites (MMCs) originate their outstanding mechanical properties from the combination of a hard reinforcement and a ductile matrix material such as magnesium or aluminum [1]. Aluminum alloys are used due to their low density, high strength, machinability, durability. Further, these materials are cost-effective too [3]. Low density material can be used for transportation, aerospace application. The rare combination of properties cannot be achieved by conventional materials. A composite material is distinct as a physical material formed artificially by adding two or more materials having dissimilar features [4]. Aluminum alloys are robust by adding other elements, attains a slightly different effect than that of original aluminum. For aluminum, copper is added which increases the strength and hardness of aluminum which makes it heat treatable [5]. Composite is a combination of the best features of each of the constituent materials [6]. The presence of dendritic erections during the solidification, with related to micro segregations, is of great notice. Since these solidification structures are commonly found in several production materials and also, greatly impact mechanical behavior [7]. Heat treatment is generally carried out to obtain an optimum combination of strength and ductility in Al–Cu alloys. Steps involved are solution treatment, quenching and artificial aging [8].

Composite material [13] generally exhibit the optimal qualities of their elements and frequently some attractive qualities which is one of the key features [9]. The Aluminium matrix's existence in lighter can be reinforced by reinforcing less thick hard ceramic elements such as Al<sub>2</sub>O<sub>3</sub>, SiC, B<sub>4</sub>C, TiB, etc, which express in the improvement of properties [12]. Boron carbide is a vigorous material having outstanding chemical and thermal stability, low density,



### Charecterisation and Mechanical Properties Evaluation of Aluminium Alloy T6-6061(Reinforced with ZrO<sub>2</sub>) subjected to Forging

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Abstract: This Paper involves the development of Aluminium T6 6061 alloy using forging process. The Standard Al T6 6061 alloy ingots was melted and super-heated in the electrical resistance furnace for about 8 hours at  $750^{\circ}$ C. The superheated melt was reinforced with zirconium dioxide in 3% and 6% weight proportions. The molten metal was poured into a cylindrical rod die of dimensions 300mm x 200mm and allowed to solidify at ambient temperature. The cast specimens were later forged for comparison study purposes. The microstructure and mechanical characterization of forged and unforged cast specimens. The microstructural characterization of forged cast sample exhibits fine grain structure with spherical morphology of secondary magnesium and silicon magnesium and silicon phase in the Al matrix whereas the unforged cast sample indicates coarse with dendrite type morphology. The strength results in terms of tensile of forged cast specimen due to refined grain structure. The hardness results in terms of brinell hardness of reinforced specimens showed decrement compared to their base alloy. Keywords: Aluminium T6 6061 alloy, ZrO<sub>2</sub>, Stir casting, Optical Microscopy, Keller's reagent.

#### I. INTRODUCTION

Metal matrix composites (MMCs) are increasingly becoming a new class of material in aerospace applications because, their properties can be tailored through the addition of selected reinforcements [1-2]. In particular, particulate reinforced MMCs have recently found special interest because of their specific strength and specific stiffness at room and elevated temperatures [3]. Applications of Aluminum-based MMCs have increased in recent years as engineering materials. The introduction of a ceramic material into a metal matrix produces a composite material that results in an attractive combination of physical and mechanical properties which cannot be obtained with monolithic alloys. Discontinuously reinforced aluminum matrix composites have emerged from the need for light weight, high stiffness materials which are desirable in many applications, mainly on automobile products such as engine piston, cylinder liner, brake disc/drum etc. The strengthening of aluminum alloys with a reinforcement of fine ceramic particulates has greatly increased their potential in wear resistant and structural applications [1–13]. There is an increasing interest in the development of metal matrix composites (MMCs) having low density and low cost reinforcements. Although these MMCs have better properties including high strength, high stiffness and better wear resistance their usage is limited due to their high manufacturing cost. Among the various discontinuous reinforcements used, glass particulate is one of the most inexpensive and low-density reinforcement. Incorporation of glass particles reduces the cost and density of aluminum and itsalloys.

#### II. LITERATURE REVIEW

A.M.S.Hamouda, S.Sulaiman, T.R.Vijayaram, M.Sayuti, M.H.M.Ahmad.[1] discusses the processing and characterization of quartz particulate reinforced aluminum- silicon alloy matrix composite which were fabricated by stir casting technique with percentages of SiO<sub>2</sub> particle varying from 5 to 30 wt% with particle size of  $65\mu$ m in steps of 5 wt%. Hardness values were measured for the quartz particulate reinforced LM6 alloy composites and it has been found that it gradually increases with increased addition of the reinforcement phase. The tensile strength of the composites decreases with the increase in addition of quartz particulate.

Sudarshan, M.K. Surappa.[2] in their paper deals with the mechanical properties such as hardness, tensile strength, compressive and damping characteristics of A356 Al and A356 Al-fly ash prepared using stir-cast technique and hot extrusion, in which 6-12 wt% of fly ash was dispersed in the base matrix. Bulk hardness, matrix micro hardness, 0.2% proof stress of A356 Al-fly ash composites are higher compared to that of the unreinforced alloy. Additions of fly ash lead to increase in hardness, elastic modulus and 0.2% proof stress. Composites reinforced with narrow size range fly ash particle exhibit superior mechanical properties compared to composites with wide size range particles.



### Abstract

A thiourea-doped lithium sulfate single crystal was grown by the solution growth slow evaporation technique. The unit cell parameters of the grown crystal determined by X-ray diffraction (XRD) studies indicated that the crystal belongs to a monoclinic crystal system with noncentrosymmetric space group P2. Ultraviolet–visible spectral study signified that the crystal possesses an energy gap of 4.54 eV with 68% transparency in the visible region. The grown crystals were irradiated by Co-60 gamma radiation with different doses of 10 kGy, 30 kGy, and 50 kGy and the effects on powder XRD, dielectric properties, mechanical hardness, linear transmittance, and second harmonic generation (SHG) of the crystal were studied. It is observed that the crystallite size, energy gap, and transparency decreased, whereas the dielectric constant, AC conductivity, microhardness, and SHG efficiency increased with an increase in radiation dose.

### **Graphical Abstract**

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