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Developing Machine Learning Techniques for Diseases Prediction in Big Data

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Abstract

A big-data revolution is underway in health care. Start with a much-improved amount of knowledge. Over the last decade, pharmaceutical organizations have been aggregating years of analysis and community data into medical databases, while payors and providers have digitized their patient records. The significant growth of big data in biomedical, healthcare teams, and scientific analysis of medical data advantages early disease detection, patient care, and community services. However, the analysis efficiency decreased when the quality of medical data is inadequate. Further, various sections exhibit unique features of certain regional diseases, which may reduce the prediction of disease outbreaks. In this study, we recommend conventional machine learning algorithms for investigation using feature uprooting expertise of Deep Neural Network studies, and we are stimulated by transfer learning methodology to this. The main aim of this approach is to examine the need for a deep Learning based security algorithm for massive data analysis. To overcome the problem of incomplete data, we use Deep Belief Networks with Disease Risk Prediction Algorithm (DBN-DRP) for structured and Unstructured data from Hospital. The DBN-DRP algorithm provides outstanding performance in big data classification than the previous methods. Compare to Existed Classification algorithms our proposed algorithms will offer better performance in classification.

Keywords: Deep learning, Deep Belief Networks, Disease Risk Prediction Algorithm, Deep Neural Network.

I. INTRODUCTION

Disease prediction using patient medication records and health data by utilizing data mining and machine learning methods is an ongoing effort for the past decades. Several works have applied to data mining techniques to pathological data or medical profiles for the prediction of particular diseases. These techniques were examined pending the case recurrence. In addition, some strategies and hope try to treat and develop the disease. The contemporary advantage of gaining in-depth knowledge in specific areas of device knowledge has led to a change in device orientation to understand ideas that can analyze specific hierarchical descriptions of raw records with little preprocessing and produce more reliable results.

With the development of the era of comprehensive statistical analysis, more attention was given to forecasting disease from the position of large-scale statistics, to improving data automatically to select traits from many facts. Several investigations were conducted into the accuracy of the type of risk [1] compared to the default homes. However, these present illustrations are usually considered subsidiary information. For example, for unstructured records, the use of convolutional neural networks (CNN) to draw textual features regularly has already attracted attention to Full-size, and also applied its fun results. [2]. However, in our experience, none of the above-mentioned panels that use CNN process information on Chinese clinical text content. Moreover, there is a big difference between diseases in unique areas, in general because of the climate, and the behavior of citizens within the place. Therefore, the type of opportunity depends on fact-based fact analysis, which leads to stressful situations: How to solve lost stats? How to describe the enormous incurable diseases in the trauma region and the primary capabilities of the disease in the surrounding areas. Artificial intelligence made the laptop more responsive and would give the community a chance to guess. Amnesty International notes the study of machines as a subdomain in various research articles. Various analysts feel that knowledge cannot be created without mastery.

DETECTION OF PLANT LEAVES DISEASE USING MACHINE LEARNING APPROACH

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Abstract:

Agriculture is a fundamental cause of living. Agriculture gives work possibilities for village people on a big scale in an originating nation like India. the plant leaves are necessary for the fast-growing plants and to improve the composition of gatherings. When different diseases within their leaves attack plants, that will consequence in the product of agriculture and valuable loss—also, the decrease in both the quality and amount of agricultural composition. It is also difficult for farmers to classify diseases in the leaves of plants. Farmers are currently spraying pesticides on plants, but this leads to people being immediate or spread through health or possibly financially. To identify these plant diseases, various fast techniques need to choose. In this paper, we suggest a fantasy-based automatic detection of plant disease detection using the Image Processing Technique. Image processing algorithms developed to identify the plant disease or attack by identifying the color feature of the leaf area. K-mean clustering algorithm is used for color segmentation, and GLCM is used for feature extraction and finally at the classification Modified Random Forest (MRF) algorithm used. The experimental results shows that the recommended system performs better classification accuracy of 86% applying GLCM features.

Keywords: Image Processing, Gray level co-occurrence, k-means clustering algorithm, modified random forest, plant leaf disease detection.

I. INTRODUCTION

Agriculture is a backbone of our country. Farmers have enough crops for their farm. Regardless, growing crops to maximize known income and manufacturing is generally medical. This may have been developed with technical assistance. Supervising that routine plants always want to have excellent strength, especially to combat diseases that can have important consequences on the elements of production for financial gain. The imaging method is of the highest quality, which has driven activity in agricultural applications. Detection of infection from plant photography (Saradhambal et al. 2018). This impact can be mitigated through aid for agricultural development. Most signs and symptoms number one are microscopic, so identity disease is restricted with the help of visible human capabilities. . This method is boring and intensive over time. There is a need for a fashion tool that recognizes, categorizes and quantifies disorder symptoms.

In the case of an industrial disease indicating a wasted stock, the disease certainly appears because the traditional method of barbecue is the performance of the general body of the country. From the current evidence, symptoms can be identified. The disease is caused by microorganisms, and this is any factor that causes the disease. Control of the disease can be a difficult task. To a large extent, disease facts appear in the leaves of the plant, or the culmination or stems of the plant. Because of the difficulty of visual patterns, the precise identification of these diseases, lesions and developments that have been

A Comparative Study of Deep Learning Models used for Object identification

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Abstract: Unstructured data remains a challenge in almost all data intensive application fields such as business, universities, research institutions, government funding agencies, and technology intensive companies. Eighty percent of data about an entity (person, place, or thing) are available only in unstructured form. They are in the form of reports, email, views, news, etc. Object mining/ analytics analyzes the hitherto hidden relationships between entities in a dataset to derive meaningful patterns which reflect the knowledge contained in the dataset. This knowledge is utilized in decision making. Object analytics converts object into numbers, and numbers in turn bring structure to the data and help to identify patterns. The more structured the data, the better the analysis, and eventually the better the decisions would be. It is also difficult to process every bit of data manually and classify them clearly. This led to the emergence of intelligent tools in object processing, in the field of natural language processing, to analyze lexical and linguistic patterns. It has been found more important to study and understand the nature of data before proceeding into mining. The automation of object identification process is required, with the increasing amount of data and need for accuracy. Another interesting research opportunity lies in building intricate object data models with deep learning systems. It has the ability to execute complex Natural Language Processing (NLP) tasks with semantic requirements. Object identification forms the base of data analytics and acts as the engine behind knowledge discovery. It supports state-of-the-art decision making, for example, predicting an event before it actually occurs, classifying a transaction as 'Fraudulent' etc. The results of this study could be used for developing applications dedicated to assisting decision making processes. These informed decisions will help to optimize resources and maximize benefits to the man-kind.

In the future, better methods for parameter optimization will be identified by selecting better parameters that reflects effective knowledge discovery. The role of streaming data processing is still rarely explored when it comes to object identification.

Keywords: object identification, classification, machine learning, statistical methods, analysis

1. INTRODUCTION

Classification algorithms form the crust of object mining techniques. Generally, a classification technique could be divided into statistical and Deep Learning learning (ML) approaches. Statistical techniques purely satisfy the proclaimed hypotheses manually, therefore the need for algorithms is little, but ML techniques were specially invented for automation. In Figure 1, the algorithms are broadly divided into supervised, unsupervised, and semi supervised categories according to the learning criteria followed.

Among the supervised classification algorithms, there are two categories, namely, parametric and non-parametric, based on the supremacy of parameters in the data. Logistic regression and Naïve Bayes are the most widely used parametric classification algorithms. Support Vector Machine (SVM), Decision Tree, Rule Induction, KNN and Neural Networks are their non-parametric counterparts. Fuzzy c-means, k-means clustering and Hierarchical clustering are unsupervised learning approaches and co-training, self-training, transductive SVM and graph based methods form the constituents of semi-supervised learning methods.

Below are some of the object identification techniques and their research directions.

Optimization Techniques Are Best Choice to Segment Blood Vessels from Retinal Fundus Images

N.C.Santosh Kumar, Y.Radhika

Abstract: The mostly affected disease which has been a curse to human kind is diabetes. This disease, irrespective of the age, causes extreme impact upon the eyes of the patients indicating abnormalities which manifests in tree-like structured blood vessels of the retina. It is so important to diagnose such patients with diabetes at the initial stage so as to save them from reaching blindness. Blood vessel segmentation in retinal fundus images is an adequate way and takes a critical role in medication and diagnosis of distinct retinal-related diseases and disorders. In this paper, a comprehensive review of various categories of segmentation techniques is presented with main focus on proving the magnificence of optimization techniques as the right choice in the process segmentation. The effectiveness of this work is straightened in relative study of discrete methods.

Keywords: Retinal fundus images, blood vessels segmentation, ant colony optimization, particle swarm optimization, bee colony optimization, genetic algorithm,

Impediments relating to the configurations of blood vessels, issues of contrast, presence of noise make the segmentation process complex. Moreover, the composites which are anomalous such as microaneurysms, diseased regions and lesions, soft and hard exudates make the segmentation task a difficult if the input image under consideration is diseased one. The figure 1 presents non-healthy and healthy retinal images.

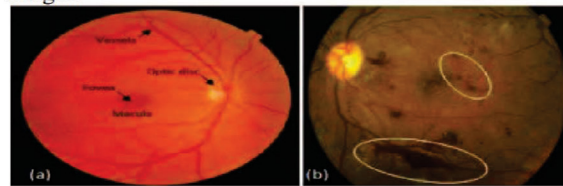


Figure-1 (a) Example of a healthy eye (b) Retinal image with leakage blood vessel of an unhealthy eye

I. INTRODUCTION

According to [1], the reason for vision loss and deaths in large count has been the result of reach of diabetes onto retina. The retinal blood vessel segmentation is a tool that helps ophthalmologists to perform perfect detection, proper diagnosis, ideal treatment, and faultless evaluation of retinal pathologies that include diabetic retinopathy, macular degeneration which is age-related, hypertension, glaucoma etc. The authors in [2] have mentioned that finding disorders in an automated diagnosis system by means of automated retinal blood vessels' segmentation is the primary step. The retinal tree-shaped structure of blood vessels has useful attributes that include width, tortuosity, length, branching pattern and angles which have high diagnostic significance that reveal the disorders in the retinal part of the eye so as to infer the condition of the patient. Also, this vascular blood vessel configuration which is unique for each individual [3] is critical in the process of biometric identification. An important aspect of automated vessel segmentation is retinal images registration related to a patient which is being taken at various points of time. The manual system of segmentation of blood vessels is a time taking tedious process and requires training. The automated segmentation process is not an easy task but is quite challenging since it deals with complex structures of blood vessels in retinal images that are impacted by various sources. Those different

The organization of the rest of the paper is as follows: Section 2 outlines various online databases which are in use so far. Section 3 deals with a detailed description of different approaches with their performance assessment which then proceeds with explanation of category-wise methods being proposed to segment blood vessels. Section 4 provides a meticulous experimental comparison of described category-wise methods of previous section. Section 5 proceeds with discussion of the distinct optimization techniques which have improved the effort of segmentation and proves them as the best choice. Section 6 gives the conclusion of this review.

II. MATERIALS

Generally, a database is a collection of objects. These objects may have similarity among them and sometimes are related to each other. It is to mention that the splendid work which has been done by researchers as part of the screening programs, research collaborations, individual interests etc, have given standard references for the quality research in this field of segmentation of retinal blood vessels. These standards are framed as benchmarks for performance comparison of algorithms that are proposed and also used as an assessment metric for various eye-related issues. A dataset is container of sets of retinal images that may be training or test set, reference standards, ground truth images etc. The discussion which is followed gives a briefing on few datasets that are mentioned in the Table 1 and have been in use by many researchers.

Drive

This database was introduced by author [4] in the year 2004 and this dataset photographs were founded from Netherland's screening

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Framework towards the Process of Estimating or Predicting Perceived QoE Based on the Datasets Obtained From the Mobile Network

Damera Priyanka, Mamidala Soujanya, Syed Abdul Moeed

Abstract: Nowadays, the research study community visualizes a standard shift that is going to put the focus on Quality of Experience metrics, which relate directly to complete consumer satisfaction. Yet, determining QoE coming from QoS sizes is a daunting job that powerful Software Defined Network operators are currently able to tackle through artificial intelligence strategies. In this paper, our experts pay attention to a few essential QoE factors, and we begin with proposing a Bayesian Network design to anticipate re-buffering proportion. This paper suggested a structure for modeling mobile network QoE, making use of the vast records analytics approach. The planned platform explains the method of estimating or forecasting perceived QoE based upon the datasets obtained or collected from the mobile network to enable the mobile network operators efficiently to deal with the network functionality as well as supply the individuals an adequate mobile Internet QoE.

Index Terms : mobile, network, datasets, prediction

I. INTRODUCTION

Web use on mobile devices makes it possible for the mobile world wide web clients (i.e., consumers) to associate with friends and family via vocal or online video calls, web browsing, e-mail, sharing of photos as well as other info through the accessible mobile functions mounted on individuals' mobile phones. Considering that, mobile world wide web users have actually ended up being the main concentration of service style for the mobile network operators, quality of experience is right now a brand-new phrase coined to be used due to the MNOs to quantify, manage, as well as strengthen the understanding of the mobile network users.

The vast use of web located services has been outlined up to the development of a fast mobile network situated on Universal Mobile Telecommunication Solutions, Lasting Advancement, and also various other telecommunications (Telecoms) criteria. Similarly, the supply of more significant information transmission velocity (throughput) allows mobile internet consumers to transcend web searching through permitting solutions, including report transfer, report download, online video streaming, and also a voice-over web protocol. Nevertheless, the mobile network operators have a tendency to restrict the existing data-rate manageable due to the consumers as a result of the high price associated with obtaining range [1]

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Simultaneously, the rise in the number of users have actually enriched competitive advantage and provision of inexpensive solutions, thereby imposing extra problem on the MNOs in providing a sufficient degree of service functionality to the mobile internet users. Specifically, mobile networks are susceptible to direct supply (including lessened channel schedule) that dynamically transforms overtime because of the nearby congestion, which commonly lead in to endangering the consumer session [4] The said instances, increase in restricted data fee as well as regional blockage can truly have impact on the mobile web individual experience. It is every bit as important to bear in mind that the desire of the mobile internet consumers is based on discovered experiences from the network performance, which are customarily expected to be secure and less congested. To allow a satisfactory level of consumer experience, the MNOs are actually needed to be properly updated regarding the visitor traffic characteristics triggered by the geographical as well as dynamic attributes of the network traffic [1] Comprehending the network traffic characteristics will allow the MNOs to plan as well as maximized the NP to recognize the topographical as well as temporal service-related Quality of Experience from both the individuals' as well as network perspectives.

However, QoS is not especially related to the user's understanding [2], as such QoS alone wants to determine the mobile world wide web users' viewpoint [3] QoE is actually a multidimensional concept that includes both the individual and unbiased aspects of the world wide web services offered by the MNOs [3] On one palm, the very subjective aspect of web solutions provided due to the MNOs targeted at subscribers' knowledge, expectation, personal as well as social background [3] While, the unbiased aspect of the net services is actually the network performance frequently embodied in the form of the QoS specifications (e.g., throughput, data transfer, loss, problem and also jitter). QoE has actually come to be a vital variable for the majority of mobile web customers when opting for aMNO. For that reason, the MNOs are actually faced with the obstacles of surveillance and gauging QoE, considering that the efficiency of individual MNO can vary between site, time of the day, as well as may certainly not always comply with the mobile internet customers desires.

Sizable volume of literature has actually proposed and also evaluated internet QoE by means of individual and also unbiased methods in each fixed-server made use of on home computer and smartphones [4]

An Enhanced Iot Accommodation Technique towards Wireless Networks

G.Ashmitha, P. Niranjan, Syed Abdul Moeed

ABSTRACT: Mobile networks presently supply connectivity to an extensive variety of gadgets, enabling the progression of impressive brand-new solutions and apps. The Internet of Things (IoT) is actually counted on to result in the development of brand-new value in mix with huge information study technology, and also possess a considerable as well as good influence on people's lives and the economic condition. Therefore, it is actually vital to possess continual development as well as technology of each wired and cordless network innovations, while developing input/output stations and also cloud computing. This paper gives an improved IoT accommodation strategy to wireless networks

Index Terms : Networks, Internet of Things, challenges

I. INTRODUCTION

IoT devices permit consumers to accomplish much deeper computerization, study, and also integration within a body. They enhance the reach of these places and also their reliability. IoT utilizes existing as well as emerging modern technology for picking up, social network, as well as robotics. IoT exploits recent developments in software application, dropping hardware costs, and modern mindsets in the direction of modern technology. Its own brand-new as well as state-of-the-art aspects deliver major adjustments in the distribution of items, products, as well as companies; and the social, economical, as well as political influence of those modifications.

It is actually pointed out that the development of innovations, like downsizing as well as electrical power saving layout of sensors, variation of networks, as well as the spread of cloud computer, will cause the amount of things hooked up to the Internet to increase from 10 billion in 2013 to fifty billion in 2020.

The "2015 White Paper on Details and Communications in Japan" provided by the Department of Internal Events and Communications explains the principle of the Internet of Things (IoT) as "a state where motor vehicles, white home appliances, robotics, locations, as well as almost all various other things hook up to the Internet as well as exchange information along with each other.

According to the principle, as things are converted into data and also computerization based on these records progresses, brand-new incorporated value will certainly be generated." Additionally, for the additional progression of details as well as communications innovation (ICT), it touches upon the assumptions for the new IoT usage (IoT 2.0). Especially, it states that "the growth of cutting-edge system modern technologies that decrease problems in the sending of a large amount of relevant information from sensing units will definitely enable the selection of encompassing scenario information directly and forecast of the future with significant record study for superior control of robotics, cars and so on." 1) This is actually a sight similar to the hyperconnected planet described in Fujitsu Technology as well as Solution Vision, which stores that new value will certainly be actually developed by blending IoT and also major information, which is expected to possess an exceptionally favorable impact on individuals's lives as well as the international economic situation).

The above-mentioned white paper on info and also communications presents also a potential ICT roadmap like the recaped one shown in Figure 1, along with IoT use situations that feature biometric relevant information surveillance in the living realm, task support, sports functionality support, independent steering vehicles, and remote operation of robotics. Innovations in input/ result terminals and also cloud computing, and also the continuous advancement and also improvement of both wired and also wireless network innovations will be essential for the awareness of such things. Specifically as pertains to cordless networks, given that the appearance of cellular phones, technological developments in the form of a brand-new interaction body when every ten years have been a steering power for the change of our lifestyles as well as business designs.

This paper takes a look at the development of cordless networks crucial for future IoT, from the beginning point of mobile interaction networks. To begin with, it describes the eyesight of as well as existing status of researches on the fifth-generation mobile communication body (5G), sensible execution of which is actually counted on to start in 2020, and also Fujitsu's approach around. Due to the opportunity the overview of 5G starts, the stipulation of a range of various IoT companies will likely have actually already begun. After arranging the requirements for potential networks to make certain a soft transition to the grow older of total implementation of 5G with flexible and also incorporated cottage of several IoT companies, this paper launches the FUJITSU Intelligent Making Contacts as well as Computer Design (FINCA) 3) idea recommended through Fujitsu.

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Machine learning approach to find the abilities in a candidate for steady employment in engineering field: A literature survey

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ABSTRACT

Artificial Intelligence techniques includes Machine Learning, Fuzzy systems, Image processing, neural networks etc. These techniques are very helpful for doing prediction, classification, and clustering and pattern recognition. Approximately each and every area of real life we require Artificial Intelligence technology. In this literature survey we focused on the industry requirement for long term employee. Industries want to recruit an employee having a very strong professional skills as well as soft skills. Soft skills plays a major role to find out the mental eligibility, stress handling eligibility and the lifespan of a job. Some industries are doing time to time mental health checkup of their employees using Artificial Intelligence techniques. In this literature survey we tried to find out the features used to check the mental eligibility and various techniques used to predict the steady employment for industry.

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1. Introduction

Students are in a transformation period between dependency and freedom these days. Many people have to cope with the stress of going from home to college as they negotiate big change in growth. Unknown and untreated students are likely to lose their employment. Such students are not able to focus on their job properly and can frequently change their career option. Sometimes they move to high depression and lose their life also. Proper guidance is required to improve the mental health of every student and recognize the strengths and weaknesses of every student to suggest the proper career option according to their mental health. Our research is to identify the features that affect the mental health of the student, finding the strengths and weaknesses of a student and recommending a solution for bright career. Mental illness is a serious issue on always college campuses. Students are able to concentrate on their research and often have an impact on forgetfulness, restlessness and exhaustion when working or learning stress at high levels. Stressful academic conditions such as demands for high studies will adversely affect the feelings, behavior and attitude of students. These circumstances will also impact student achievement and discourage students from meeting learning objectives successfully. The recognition of the problem of mental wellbeing is crucial to minimize physical and psychological

harm in the early stage. The study key aims to classify the characteristics that influence mental health students. (Extraction of the feature). We want to use various machine learning algorithms to categorize students as 1. Timid 2. Coward 3. Normal 4. Courageous and suggest them a better career option according to their mental health.

2. Literature survey

The authors carried out a study, in the form of a questionnaire, and compared the students' attitudes of potential employers on the necessities of interpersonal skills of function effectively in the field, in [8]. Employers were often asked to demonstrate their aspirations for effectively working in the sector from new graduates with respect to their communications abilities. Employers were also required to study the expectations of new graduates for leadership skills. In Cronbach's alpha (α) the internal precision of the survey system was measured. Some of the qualities considered were integrity & integrity, troublesome management, teaming and analytical reasoning that are resilient to changing circumstances, oral communication and leadership abilities. For students, $\alpha = 0.88$ was observed and for staff was $\alpha = 0.94$. The writers considered that the students from the field of architecture had participated in [8].

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A CONCEPTUAL FRAMEWORK FOR UNDERSTANDING THE ROLE OF MACHINE LEARNING IN ARTIFICIAL INTELLIGENCE

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Abstract

"Machine learning" and "Artificial intelligence" has become prominent within the last decade. Both terms are frequently made use of in science and media, occasionally mutually, often with different significances. In this job, we intend to make clear the connection in between these terms and, particularly, to define the payment of machine learning to artificial intelligence. Presently, there is an alarming need for a write-up that provides an alternative literature study of worldwide, academic frameworks as well as functional experiences in the field of artificial intelligence. This paper reports the state-of- the-art on expert system in an integrated, succinct, as well as elegantly distilled manner to reveal the experiences in the field.

Index Terms :Artificial Intelligence, Machine Learning, framework

I. INTRODUCTION

Machine learning (ML) is the clinical study of algorithms as well as statistical versions that computer systems use to execute a details job without utilizing specific guidelines, relying on patterns as well as inference instead. It is seen as a subset of artificial intelligence [1] Artificial intelligence formulas build a mathematical version based on sample information, known as "training data", in order to make predictions or decisions without being explicitly set to do the job. Artificial intelligence algorithms are made use of in a wide array of applications, such as e-mail filtering system as well as computer vision, where it is difficult or infeasible to develop a conventional formula for efficiently performing the task.

Machine learning is very closely related to computational statistics, which concentrates on making forecasts making use of computer systems. The study of mathematical optimization provides approaches, theory as well as application domain names to the area of artificial intelligence. Data mining is a discipline within artificial intelligence, as well as focuses on exploratory data analysis through without supervision learning. In its application across company issues, artificial intelligence is also referred to as anticipating analytics.

In the 21st century, AI has become a vital area of study in all areas: Engineering, scientific research, education, medication, service, accounting, money, advertising and marketing, economics, stock market, and also legislation, to name a few. The series of AI has expanded enormously since the intelligence of makers with machine learning abilities has created extensive influence on company, governments, and culture. They also influence the bigger patterns in international sustainability. Expert system can be valuable to address critical problem for lasting manufacturing (e.g., optimization of energy resources, logistics, supply chain monitoring, waste management, and so on) [2] In this context, in smart manufacturing,

Changing Paradigms of Indian Foodtech Landscape - Impact of Online Food Delivery Aggregators

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ABSTRACT

The purpose of this study is to depict the perception of consumers on the discount factor, future of food tech applications, tampering of family values, dine-out culture, technological anxiety and their impact on satisfaction behaviour. Millennials are the precedence audience for the online food aggregators. Generation X is different from other generations in perceiving discount factors. Future of food applications rely on the Discounts. Restaurant operators can focus on giving their customers an increased level of convenience and more discounts since these tend to be the reason for them to choose ordering food online. Optimisation is vital as increase in Technological anxiety increases the perceived future of food application and decreases the satisfaction behaviour.

Keywords: Online food delivery; Aggregators; Food applications; Deep Discounting; Dine-out; Future of food apps.

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A Study on Internet of Things based Trigger Points with Deep Learning in Education System

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Abstract— Due to the existence of modernized educational systems, encouraging students and teachers to cope up with the trend remains as the primary task. For instance, in share market the trend of one trigger point for both buyers and sellers is identified very easily. The student's trigger point has to be identified by considering every student's past performance with the indication of present performance. Researchers have satisfied this need by deploying an IoT based student location identification and a deep learning model for analyzing data and students' performance. This trigger point will be helpful to motivate students in the aspects like their thoughts, educated values, facilities, infrastructure development broadly as per the guidelines of education system and to compete with the present competitive world. This method will be helpful for the students present all over the world.

Keywords— Trigger point, global education system, emerging trend, IoT, deep learning.

I. INTRODUCTION

In any stream a balancing point has the ability to lead the entire system, in marketing aspects, it is called as break-even point, whereas in the education system it refers to the minimum qualification marks as well as classes with the grades. All these help to calculate and lead the unity of the system in their respective stream. In the present education system, educational institutions have already collaborated with the multinational education institutions and universities. In these different likeminded educational institutions, considering a particular student's expectations with some goals and register what they need from the educational institution, it also remains as one type of trigger point for education which is already existed in a manual way of working only within few courses and few students and particularly limited to some educational institutions.

Now-a-days the technology involved in the globalization of the education system is with the inference of different types of systems. So as per the student Psychological level, the education standard depends only on the capability of his/her strength, so here in the present scenario every student is individually identified with involvement of latest technologies like pure pulse and deep learning technologies to interlink the

student background knowledge and its leads to educate them by using the IoT platform.

Neural network architecture with multiple layers of processing units that apply linear and nonlinear transformations to the input data is deep learning. It includes all types of data such as image, audio, text, numerical, or some combination of them.

A significant research attention has been drawn by the Deep Learning (DL) in both the industry and research areas in the last decade. Heavy investment is done on the development of hardware and software innovations of DL in the production of smart products by major companies like google, facebook, microsoft, amazon, and apple.

II. REVIEW LITERATURE

The author described the systematic review of DL in performing data mining in education [1] Survey has been carried out for applying DL to Educational Data Mining (EDM) from its origin to 2018.

The author in [2] describes the state-of-the-art researches on student learning patterns. It tells about the internal and external relations of learning patterns that are reviewed and the new directions in learning patterns of research are examined.

Author Romero and Ventura in [6], is the first EDM survey developed in 2007 and this was further improved in 2010 [4] and 2013 [3]. In the later, the authors analyzed and identified eleven categories or tasks in EDM are analysis and visualization of data, providing feedback for supporting instructors, recommendations for students, predicting student's performance, student modeling detecting undesirable student behaviors, grouping students, social network analysis, developing concept maps, constructing course wares, planning, and scheduling.

Baker and Yacef [5] has identified four applications/tasks in this field: improving student models, domain models, studying the pedagogical support with the learning software, and scientific research.

The authors in [9] discussed the "attitude, behavior, and cognition" of the learners in exploiting the learning analytics model on it.

Glance On Blockchain Technology And Applications

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Abstract: The term blockchain pasteurizes the chain of blocks like linked lists which will be linked to the previous block. A blockchain is a distributed ledger of digital transactions which is decentralized and no individual, team or company has its controllability over it. However, with time, the use of blockchain has come into existence. It has wide range of applications including risk management, credit money, Internet of Things (IoT), social networks, and financial resources. Blockchain has many benefits like decentralization, persistency, anonymity, auditability. Blockchain is trustable one and it is very efficient. In particular, this paper gives us the detailed information about the blockchain and its applications.

Keywords: Blockchain, cryptocurrency, ethereum, bitcoin.

1. Introduction

It first came into action in 2008 by Satoshi Nakamoto, the best known digital currency [1]. The first and foremost application of blockchain is Bitcoin. Bitcoin got succeeded and made the people know about blockchain and it is leading to the trust worthy transactions. Blockchain is having mainly three pillars decentralisation, transparency, immutability. This survey consists of all the domains where blockchain impacts and where the upcoming changes will occur using blockchain. Section 2 provides the information about the technology before blockchain. Section 3 gives us the brief explanation about blockchain and its concepts. Section 4 includes the principles of blockchain. Section 5 shows us the Blockchain Architecture. Section 6 has the categories of blockchain. Section 7 contains the applications of blockchain. Section 8 shows us the challenges and other related works of blockchain. Section 9 concludes the paper shows the future ways to expand blockchain.

2. Antecedent Technology Of Blockchain

The technology preceding blockchain is the technology which is centralised. Blockchain eliminates the problem of double spending with the help of a cryptographic public key, whereby each member is assigned a public key shared with all other members.

3. Overview Of Blockchain

The two most critical problems of currency based transactions can be solved by blockchain technology. Both are popularly regarded as the dilemma of the Byzantine Generals and the dilemma of



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1



Reducing Overfitting Problem in Machine Learning Using Novel L1/4 Regularization Method

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Abstract—The Machine learning model has two problems, they are Overfitting and Under-fitting. Underfitting is a statistical model or a machine learning algorithm, it cannot capture the underlying trend of the data. A statistical model is said to be overfitted when it has been trained with more data. When the model is trained on fewer features, the machine will be too biased, and then the model gets under fitting problems. So, it has been required to train the model on more features and there is one more problem that occurs. To reduce the overfitting problem, regularization functions and data augmentation are used. Lasso shrinks the less important feature's coefficient to zero thus removing some feature altogether. L2 regularization, on the other hand, does not remove most of the features. A novel regularization method is proposed to overcome these problems.

Keywords— Lasso regression, ridge regression, machine learning, activation function

I. INTRODUCTION

In machine learning, the model is trained [1] based on some features. Sometimes our model accuracy is low on new data. There may be two types of problems that occur. Overfitting and underfitting.

A. Underfitting:

If few features are given to train the model, sometimes it can wrongly identify unknown data as shown in figure 1. To reduce underfitting [2, 3] problem, the feature selection should be increased.

B. Overfitting:

If huge features are given to the trained model, then the model will get the overfitting [4, 5] problem as shown in figure 1. When the model is trained on fewer features, the machine will be too biased, then the model gets the underfitting problem. So, it is required to train the model on more features and there is one more problem that occurs. If the model is trained on more and more features, more variances came into the picture, and then the model identification efficiency will be very low. It leads our model to worse. This problem is known as overfitting problem.

Bias: it calculates our model predictions are how much difference is there to the correct value. Variance: It denotes the predictions given by our model for a given point vary between different realizations.

How to overcome underfitting?

- Find more features
- Try high variance machine learning models (Decision tree, K-NN, SVM)

When the test error is much heavier than the training error, it has been concluded that there is an overfitting problem.

Previously, L1 and L2 regularization methods and activation functions are used to minimize the overfitting problems, but the efficiency is very less. So to reduce the overfitting problem, to get more accuracy, the research has been extended on regularization methods.

II. VARIOUS ACTIVATION FUNCTIONS IN NEURAL NETWORKS

A. Linear Function :-

General equation for a straight line, $y=mx$, this equation is used for linear function [6].

- This equation is applied for input layer. And activation functions to last layers.
- Linear function range is $(-\infty, +\infty)$
- There are some issues in this linear function. If this function is differentiated, it is independent of x , i.e input.

The best example for this type of function is house rent analysis. This is a regression problem, using this linear function, a linear function can be added for output layers.

B. Sigmoid Function :-

Sigmoid activation function [7] plotted as 'S' shape. General equation for a straight line, $Z = 1/(1 + e^{-x})$, this equation is used for linear function.

- This equation is applied for input layer. And activation functions to last layers.
- Linear function range is $(0,1)$
- There are some issues in this sigmoid function. The differentiated equation is also dependent on ' x ' input.

The best example for this type of function is house rent analysis. This is also a regression problem, using this linear function, a linear function can be added for output layers.

- Result can be determined to be 1 if value is greater than 0.5 and 0 otherwise.

Text classification using Machine Learning and Deep Learning Models

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Abstract: In all applications where data plays an important role such as universities, business, research institutions, technology intensive companies and government funding agencies, maintaining irregular data is a big challenge. For an entity (object, place, thing), most of the data is in irregular form. Till now data analytics or text mining examine the entity relationships in a dataset to obtain significant patterns that reflects the information that is there in the dataset. This information is used in making decisions. "Text analytics translates text into numbers and numbers" in order makes up the data and assists to detect patterns. If the data is more organized, the better is the analysis, and eventually the decisions would be better. Manual processing of every bit of data is difficult and also to classify the data. This causes intelligent text processing tools to emerge in the area of NLP, to analyze linguistic and lexical patterns. Before mining it is significant to revise and be familiar with the nature of data. With the expanding measure of information and requirement for precision or accuracy automation process is required for the text classification. Another attractive research opportunity is constructing complex "text data models using Deep learning systems" which have the capability to carry out intricate NLP tasks with semantic requirements. Data analytics forms the basis of text classification and it can act as the engine behind information exploration. These results could be used for emergent applications that support decision making processes. These decisions assist human beings to improve resources and give the majority of benefits. Future research includes improved methods for parameter optimization that reflects effective knowledge discovery.

Keywords: Statistical Methods, Machine Learning, Text Classification

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1. INTRODUCTION

Machine learning algorithms can be divided into supervised, unsupervised and reinforcement learning [2]. Supervised learning is the errand of gathering a capacity from the preparation information. The preparation information comprises of a lot of perceptions together with its result. Supervised learning can be further separated into classification and regression [3]. Classification methods are utilized to foresee categorical values and Regression methods are utilized to anticipate numerical qualities [1]. The well-

known regression methods are polynomial regression and linear regression. The well-known classification methods are K-nearest neighbors, Decision trees and Logistic regression. Unsupervised learning [5] includes a lot of algorithms used to draw deductions from datasets comprising of information without utilizing the result. The popular unsupervised learning algorithms are principal component analysis, k-means and clustering. Reinforcement learning [6] is an advanced topic. Below are some of the text classification techniques and their research directions.

Survey on Fuzzy Associative Classifications Techniques and Their Performance Evaluation with Different Fuzzy Clustering Techniques Over Big Data

- Raghuram Bhukya Jayadev Gyani

Conference paper

First Online: 19 May 2020

Part of the [Lecture Notes in Electrical Engineering](#) book series (LNEE, volume 601)

Abstract

In the current trend of data science research lot of works concentrated over scaling conventional data classification algorithms towards handling massive datasets referred as Big data. The standard of classification algorithms evaluated based on their accuracy, interpretability and intuitiveness. It is well proved in studies that the using fuzzy generalization in classification will improves the above three factors of classification model. Considering the importance of fuzzy associative classification models this article revise their inception to current extension to MapReduce frameworks. The primary challenge in such techniques is in deciding which clustering technique is well suited for extracting fuzzy generalization parameters. Considering that an experimental study conducted on various clustering algorithms extended to MapReduce framework and their performance evaluated based on effectiveness of the generated fuzzy parameters with respect to classification accuracy.

Keywords

Fuzzy associative classification Fuzzy clustering MapReduce framework Big data

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A Review of Machine Learning Algorithms on IoT Applications

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Abstract— Worldwide Internet is emerging as a new model for communication and trade. Today, the Internet is only intended to modern visions but also the unquestionable cornerstone of the digital age. In factories, oil platforms, cars, trucks and trains IoT has grown up — a revolution in manufacturing processes that has changed for some time. Virtually all sectors — agriculture, air travel, mining, health care, electricity, transport, intelligent towns — have been entered into it, and so on. IoT is not just the next step of the Internet — the Internet as we know it is actually being reshaped. In this work analysis on how IOTs are used in real life. The complete study on IOT applications.

Keywords— IoT, android device, IoMT, smart home, decision tree.

I. INTRODUCTION

In a change of wired and remote advances, the IoT idea was introducing. IoT gets more thought over ongoing years for the development of any application. According to IoT infers that each dissent or anything is related and without human participation grant through the Internet. As indicated by the IoT overall action standard, in the worldwide media transmission union, the IoT idea isn't limited for physical things. It similarly consolidates the virtual articles. It suggests that to stand out a machine from machine innovation should be conceivable with the assistance of IoT ideas.

Some of the Smart home application uses the idea of IoT. IoT based Smart home fuses an IOT Based Monitoring System uses the sensor part and correspondence part [1]. The correspondence part consolidates blue-tooth and WIFI to connect with adaptable devices, cloud servers, and articles. In any case, blue-tooth have a recently 10M area for correspondence. Regardless, IR cannot transmit through dividers and any obstacle. So businesses of IR are the weakness of such an application. We are using IOT innovation to crush this drawback. The essential target of IoT is to improve the idea of human life the IOT joins the Smart homes, smart building, intelligent cars, etc. in human life. We are building up an endeavor for a keen city using IOT based application. We are using a development finder sensor that measures the characteristic data. A look at this data and give yield. Similarly, it fuses a raspberry pi and hand-off. Raspberry pi is just a little processor that processes the data for sensors and provides the respect transfer. The transfer is only an electrical circuit that manages the forced stream concurring the data given by the raspberry processor.

In this application, the development sensors are passing on in a room or office. The development sensors are using to recognize development. By then, these sensors send the data to a raspberry pi. Raspberry pi processes the data as shown by condition and submit the appropriate respect transfer. By then, the transfer takes commitment from raspberry pi and perform a legitimate activity.

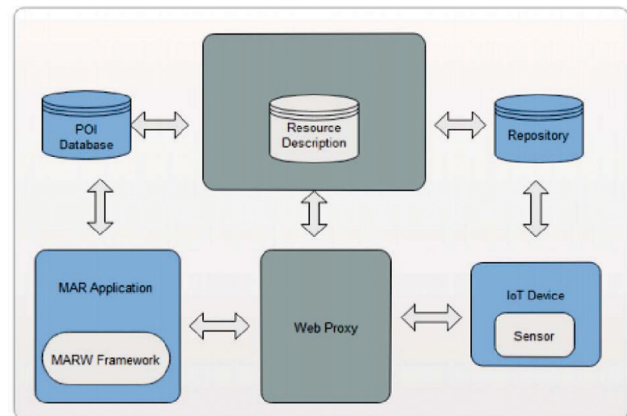


Fig. 1. System Architecture.

II. BACKGROUND

IoT in Applications: Underneath the vision of this IoT, programming may be programmed by disapproving of themselves presented to some unique air [2]. The Astute conduct pushed from the machine may be incited to adapt to rough conditions. The reasons from the previously mentioned area names will convey more noteworthy diagnostic results in the ensuing obstructions that are decisively taking adequate consideration.

The critical players of all set, while in the previously mentioned application area names are RFID and GPS [3]. RFID is only one of irrefutably the most helpful instruments to transmit and get information utilizing distant recurrence with no links and in the base charge.

An inevitable drawback of the innovation might be that the peruse crash that may happen once the signs out of more supporters coast or many marks exist in a little area. Even though plenty of frameworks use an enemy of mishap convention to permit the labels to shoot transforms into transmitting into an individual per user, at that point that this issue keeps on being. Still, another durable blockade is the way that the overall details of RFID aren't yet perceived.



STUDENT PAPERS IN JOURNALS

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCES

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AI as a Challenging Problem : Solvable without Data but Morally Intelligence-driven Insights

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ABSTRACT

In this paper, we shall try to shed some light on the very pressing and challenging issue of ethics in technologies under the umbrella of AI. This concern has to be discussed extensively by philosophers, economists, and AI research scholars and this process of discussion is a continuous one. Autonomous services especially those involving the use of systems that have both aspects socio-technical [5] ones can increasingly become a major factor in making the environment hostile. The inclusion of human morals into human-level intelligence systems [8] is crucial. The capacity of the human mind for formulating, ideating, conceptualizing, thinking, innovating and solving complex problems is minuscule compared with the mass of the problems, those of whom have solutions, which are essential for objectively rational and moral behavior in the real world or even for a novice reasonable approximation to such target sanity. Equally important notions to be considered to avoid possible shortcomings in and havocs due to this technology are involvement of human ethics, consideration of social and moral implications of the same.

Concepts

- Artificial Intelligence → Dangerous
- Human Ethics → Ethical Autonomous Intelligent Systems

Keywords: AI-Artificial Intelligence, ML-Machine Learning, Intelligent agents, Ethics, Privacy, Big Data, Governance, Regulation, AGI-Artificial General Intelligence [2]

I. INTRODUCTION

The most interesting part when it comes to AI is that people while imagining about it take it to be a technology of such a kind wherein they will be finding solutions to almost all of their problems and feel fascinated by the tempting thoughts that it may transform the world into a utopia. But less of it is known that technologies like these may result in dire consequences if not regulated by its makers, and the intelligentsia. First, let's take a look at AI followed by ethics separately and then discuss their dependence

on each other. The remaining paper is formatted to give an access to all concerned facts and figures about "AI-Ethics".

II. METHODS AND MATERIAL

1. AI

The futuristic role that 'artificially intelligent' technology [9] – something depicted as more sophisticated and advanced than humans – could play in doing things accurately is not haunting until we

MACHINE LEARNING APPROACH FOR SERENDIPITOUS DRUG USAGES DATA IN SOCIAL MEDIA

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Abstract

Drug repositioning has prominent advantages of lower safety risk and development cost than developing new drugs. It has attracted broad interests from the biomedical community. In the past decades, computational approaches have examined biological, chemical, literature, and electronic health record data for systematic drug repositioning. But due to the limitations of these data sources, neither of them alone appear sufficient for drug repositioning research. In recent years, more and more patients go to social media to report and discuss their medication outcomes. Of these reports, we noticed mentions of serendipitous drug usages, which we hypothesize to be new, independent data to study drug repositioning, in the sense of complementing other existing data sources to identifying and validating drug repositioning hypotheses. In our first work, we examined medication outcome information available on four social media sites, namely WebMD, PatientsLikeMe, YouTube, and Twitter. We found the patient health forum of WebMD the best social media site for our research in terms of data availability and quality, but colloquial patient language is challenging for computers to process. This research is also used NLP and machine learning methods to identify serendipitous drug usages in social media text. We curated a gold-standard dataset based on filtered drug reviews from WebMD. Among 15,714 sentences in total, manually identified 447 sentences mentioning novel desirable drug usages that were not listed as known drug indications by WebMD and thus were considered serendipitous drug usages. We constructed features using NLP methods. Then we built SVM, random forest, AdaBoost.M1, and deep learning models and evaluated their prediction power on serendipitous drug usages. Our best model (AdaBoost.M1) achieved an AUC score of 0.937 on the independent test dataset, with the precision equal to 0.811 and the recall equal to 0.476. Our models predicted several serendipitous drug usages, including metformin and bupropion for obesity, tramadol for depression and ondansetron for irritable bowel syndrome with diarrhea, which were also supported by evidences from scientific literature. These results demonstrated that patient-reported medication outcomes on social media are complementary to other data sources for drug repositioning. NLP and machine learning methods make this new data source feasible to use.

IDENTIFICATION OF SPAMMERS ON TWITTER USING MODIFIED RANDOM FOREST CLASSIFIER

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Abstract:

One of the most popular online social networks is twitter that users can share short textual data called tweets. Researchers have defined that this network is subjected to spammer's attack higher than other social networks and more than 6% of its tweets are spam. The detection of spam tweets is essential. Firstly, in this study, we find various features for spam detection by using a clustering algorithm based on the data stream, and we identify spam tweets. The Classification algorithms performed previous works in the field of spam tweets. It is the first time that for spam tweets disclosure, a data stream clustering algorithm applied. Then stream Algorithm can gather tweets and investigate outliers as spam. Results show when this algorithm set accurately, the number of accuracy and precision of spam tweets discovery will improve, and the false-positive rate will achieve the least value in clustering with early work. This paper suggests an inductive-learning system for the detection of Twitter-spammers and applies a Modified Random-Forest (MRF) mechanism to a restricted set of characteristics obtained from traffic. Experimental results show that the proposed method exceeds current approaches to this problem.

Keywords: Social media, Spammer, Twitter, Spammer Detection, Fake user identification, Modified Random Forest.

I. INTRODUCTION

In a twitter network, it is beneficial to remember the behavior of the social network. Users communicate through brief "Tweets" (140 characters maximum), which can be considered with the assistance of customer fans and retrieved or "retweeted". There are two types of friends on Twitter. Consumers of Alice are any consumer Bob who agrees to receive Alice's Tweets. In contrast, Alice Follower is the one who was tracked with the help of Alice. These relationships are not reciprocal: even though Alice follows Pope, Pope will no longer join Alice. Unlike different social media, Alice can post Tweets on Bob's website without permission, because Alice does not want to be a fan of Bob to post Tweets on Bob's profile. Due to this mechanism, spammers can send spam to someone's page without permission. Likewise, cybercriminals can place malicious hyperlinks in the profiles of their fans, direct them to phishing pages, or post malicious software. The biggest problem with Twitter is the ability to automatically receive subsequent updates for a vast price range and to subscribe to fan profile pages without following them in the lower back. The archive provides a way to check user behavior and tweet content to discover appropriate features for meeting Twitter senders. The research follows the idea suggested in [1], which indexed a set of 62 spam detection features, and used a fantastic carrier system. The approach suggested here is to expose spammer profiles with the most real use of five capabilities and a machine is applied to find out the technique primarily based on the Random Forest rule set [2]. To obtain an honest assessment, the document uses a set of equal statistics presented in [1] and shows that the era of random forest compares favorably with. Experimental effects also indicate that the principle of spam detection is working correctly without affecting typical performance in real-time while reducing the load on the account.

Getting any type of statistic from any source around the world with the Internet has become very modest. The accelerating demand for social sites allows customers to obtain a large number of statistics and



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VIEWS



It gives me immense pleasure to know that the next issue of newsletter is ready. I congratulate all those who have contributed in bringing this out. I appreciate the efforts of the editor board in collecting the information related to this newsletter.

Dr. K. Ashoka Reddy
Principal, KITSW



It's a pleasure to announce the release of focus which majorly comprises articles with the updates in the latest technology. The unique feature of this newsletter is that it is being planned and designed by the students.

Dr. V. Shankar
Prof. & Head
Department of CSE

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- ✓ **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ✓ **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ✓ **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ✓ **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ✓ **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- ✓ **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- ✓ **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Outcomes (POs): M.Tech

- ✓ **Engineering Knowledge:** An ability to independently carry out research/ investigation and development work to solve practical problems.
- ✓ **Problem Analysis:** An ability to write and present a substantial technical report / document.
- ✓ **Design/Development of solutions:** Students should be able to demonstrate a degree of mastery over as per the Specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

Program Specific Outcomes (PSOs): M.Tech

- ✓ **Software Development and Quality Assurance:** Apply the Knowledge and current technologies of software engineering to Pursue Research over complex problems of Computer Science domains.
- ✓ **Maintenance:** Equipped with the Industry Ready, Teaching Skills and Entrepreneurship Capabilities.
- ✓ **Immediate Professional Practice:** plan, manage and assess effectively the software products by using the Software Engineering Concepts and Methodologies.





KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE

Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.

కాకతీయ ప్రేక్షాగిరికి అంబ విజ్ఞాన సంస్థానం, వరంగల్ - 506 015 తెలంగాణ, భారతదేశము

కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - 506 015 తెలంగాణ, భారతదేశము

(An Autonomous Institute under Kakatiya University, Warangal)

(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Vision

Attaining center of excellence status in various fields of Computer Science and Engineering by offering worthwhile education, training and research to improve quality of software services for ever growing needs of the industry and society.

Mission

- ✚ Practice qualitative approach and standards to provide students better understanding and profound knowledge in the fundamentals and concepts of computer science with its allied disciplines
- ✚ Motivate students in continuous learning to enhance their technical, communication, and managerial skills to make them competent and cope with the latest trends, technologies, and improvements in computer science to have a successful career with professional ethics.
- ✚ Involve students to analyze, design and experiment with contemporary research problems in computer science to impact socio-economic, political and environmental aspects of the globe.

Program Educational Objectives (PEOs): B.Tech

- ✓ Graduates with fundamental knowledge should escalate the technical skills within and across disciplines of Computer Science Engineering for productive career by maintaining professional ethics.
- ✓ Graduates should develop and exercise their capabilities to demonstrate their creativity in engineering practice and exhibit leadership with responsibility in teamwork.
- ✓ Graduates should refine their knowledge and skills to attain professional competence through life-long learning such as higher education, research and professional activities.

Program Specific Outcomes (PSOs): B.Tech

- ✓ **Software Development and Quality assurance:** Transform various legacy or manual systems into computer automated systems using Modern Programming Languages, Integrated Development Environments, and apply Testing Tools for efficient verification and validation of those software systems
- ✓ **Maintenance:** Demonstrate knowledge in fixing and updating multidisciplinary software problems working in real time environment.
- ✓ **Immediate professional practice:** Work as a software practitioner or continue higher education by adopting advanced technologies in various fields of computer science and Engineering.

Program Outcomes (POs): B.Tech

- ✓ **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ✓ **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

