An Investigation into Artificial Intelligence and the Challenges it Faces

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Abstract

Dartmouth College was the site of the initial research and development of AI in 1956. Cognitive scientist Marvin Minsky has a positive outlook for the development of technology in the future. The state of the government's finances worsened throughout the years 1974–1980, and many people were critical of the progress that had been accomplished in this area. An approach to the construction of a computer, a robot, or a product is referred to as artificial intelligence (AI). Artificial intelligence (AI) attempts to solve problems in the same way as the human brain does by thinking, learning, and making decisions. In conclusion, this research presents the publication of intelligent software systems. AI enables technology companies to perceive the system, which then processes and responds to the data that has already been produced or acquired by its sensors, such as the camera. The burden placed on humans to carry out a variety of jobs on a consistent basis can be significantly lessened with the help of artificial intelligence. By repeatedly doing what its human programmer instructs it to do, technology can finally learn how to function properly. The automation of many operations helps reduce the amount of time spent on tedious and repetitive work. They are able to make optimal decisions since they are based on various signals. Artificial intelligence has had a positive impact on society thus far, bringing with it contributions that make life easier for us as human beings. These contributions include improving our routine with virtual and home assistants, as well as effectively storing and analyzing data in a variety of industries. It is anticipated that artificial intelligence would generally have a beneficial impact rather than a negative one on society. This is despite the fact that new uses for technology require it to go through a number of learning experiences and face a number of hurdles as it develops. It is essential to have a good understanding of the differences between human intelligence and artificial intelligence in order to better prepare for the future society in which artificial intelligence (AI) will have the most far-reaching impact on our lives. This can be accomplished by having a good understanding of the differences between AI and human intelligence. The act of reflecting on one's own experiences is an essential component of both human and biological intelligence. The future of artificial intelligence is in no way a dystopian vision, but as users, we need to be aware of the dangers that come with developing AI and

depending on it. In the end, artificial intelligence is a powerful tool, but it is not a solution in and of itself. This fact should be reflected in the appropriate development and implementation of AI.

Keywords: Artificial Intelligence (AI), Investigation**,** convolution neural network, Education, Robot, Computer

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1. Introduction

The development of a computer, a robot, or a product using artificial intelligence is an example of an approach. Artificial intelligence (AI) attempts to solve problems in the same way as the human brain does by thinking, learning, and making decisions. Finally, this research paper publishes a system that has intelligent software. It is a reference to both Theory and the wider development of computer systems that are capable of carrying out jobs that traditionally have required human intelligence. Consider the similarities between human intellect and artificial intelligence, for instance. The term can be used to refer to any display of machine qualities connected to learning about the human mind and coming up with solutions to problems. Benefit refers to any condition, circumstance, opportunity, or means, especially the result that is favorable or desired for success. This word can be applied to any display of machine properties related to the human mind. The difference between good and evil is that evil is a weak or undesirable trait.

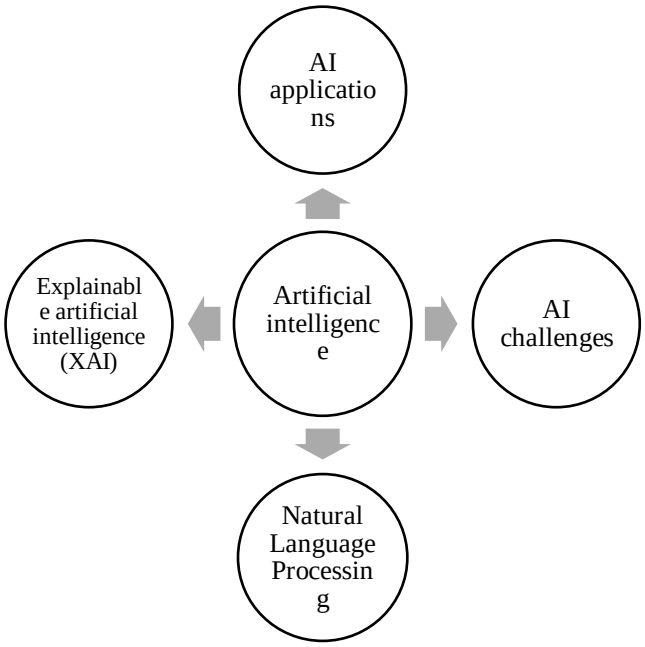

FIGURE 1. Artificial intelligence

A person is said to be in an unfavourable or unfavourable circumstance if they are said to be experiencing a disadvantage. One illustration of a drawback is the fact that a baseball player is unable to play. A poor example is provided by the fact that the team's star player is currently out with an injury. Some are gaining in popularity. We are able to optimize these transactions and give better services to our consumers by utilizing Amazon's Echo, which is capable of simulating human thought processes in computers. Because of this, their computers are improved. Artificial intelligence A robot that can do tasks often associated with intelligent organisms and that is controlled

by a digital computer or other technology. Machine translation by means of continuously connected neural networks and picture categorization by means of modified neural networks are two examples. Learning has become more popular as a result of research that was recently published by Google Deep Mind.

2. Artificial Intelligence

A domain that is considered auxiliary. Artificial intelligence (AI) is a form of machine learning, which is a form of deep learning ML technology that learns and creates predicts statistical patterns in data and, eventually, data that is unseen. for the purpose of acquiring and making educated guesses about complicated data such as a picture by applying multiple layers of mathematical processes. This brief descriptive evaluation provides an overview of the application, which includes dental research and discovery in addition to picture analysis, prediction, and recording. Both the constraints and the possible AI-based dentistry diagnosis, treatment planning, and future behavior; we see the necessity to build the appropriate norms for artificial intelligence and peaceful cohabitation between humanity and AI. Therefore, we will now be focusing on: In this essay, we will explain six different discussions that surround Within the context of the PESTEL framework, we discuss the six potential dangers and benefits posed by AI as well as its six lemmas. By doing so, we shed light on what is real and what is imagined. [Cause and effect] Then, Convolve-Fast is using one of its intelligence technologies as an alternative to more conventional approaches to the process of modelling ecosystems. As an alternative to more conventional technology, Israel is putting its eggs in the basket of intelligence technologies. Recognizing the potential of artificial intelligence modelling has helped to expand its application in the field of environmental science. Artificial intelligence reflects human observation, learning, and logic for the purpose of solving complicated problems. This page outlines many AI techniques: The recognition of the potential of artificial intelligence in environmental modelling has helped to expand its application in this field. This page describes many AI approaches. It explains how AI can assist pupils in deciphering the challenges they face. Learn how to be of assistance to them and foster a sense of imaginative community. When we look back at our earlier experiences and compare them to our current learning environment, we don't find that many distinctions. However, after planning and carrying out a brand-new educational experience as well as doing an analysis of the various options currently available, the most important outcome has become crystal evident. The terrain is being modified and reinvented by the AI system, even though our traditional schooling has not been totally transformed into AI. It would be a mistake to try to use AI to radically revamp how people interact with one another. This article includes information on three unique life cycle phases associated to one or more jobs that should be considered by AI. These phases are design, control, and maintenance, respectively.

Artificial Intelligence Applications

We will be able to improve these transactions and deliver better services to our consumers if we can teach computers to think in the same way that people do. This results in them becoming superior computers. We report the sources as representatives of the medical industry after conducting an assessment outside of the Department of Orthopedic Surgery. This highlights the burgeoning

applications of AI in orthopedic surgeons in the areas of warranty, currency, and usefulness. Providing their patients with superior service and care that is both optimal and focused on value. On the other hand, something known as a synthetic neural network was used to improve the cryptographic encryption of 3D vertebrate model vectors. While most of the these original machine learning applications in orthopaedics concentrated mostly on imaging-based diagnosis and prognosis, their current and advanced applications prognostic models concentrated on effects. Models of operations and treatment that are value-based and patient-specific. Recent research conducted by Heberley and colleagues examined these novel uses, focusing specifically on imaging-based analytics, value-based payment models, and mobile healthcare technology for use in joint replacement surgery on lower extremities. This review comes to the conclusion that the incorporation of machine learning (ML) is essential for orthopaedic surgeons in order to enhance the quality of care they provide to patients and provide support for them through alternative payment models, which this review reveals to be both novel and effective. It is anticipated that electrical power utilities and customers will enjoy the highest quality At the moment, one of the most important concerns is the creation of innovative methods for the automated classification of voltage and current wavelength PQ events at the rated frequency. Optical approaches in classification Digital signal processing, artificial intelligence and PQ disturbances. Several different signal processing algorithms, including transform, make use of extraction characteristics. These approaches, along with their hybrids, are discussed here. Fourier Transform, Wavelet Transform, S-Transform, Hilbert Transform, Copper D Signal processing, artificial intelligence, and various optimization strategies are utilized in the process of classifying different types of PQ disturbances. In this article, advanced strategies for the extraction of features similar to Fourier's are discussed. These techniques include transformation, frequency change, S-Shift, and Hilbert-Huang Shift. Classifiers in artificial neural networks and support vector machines are often generated with the assistance of artificial intelligence techniques. Imprecise logic and the use of expert systems. In this section, we give an overview of the LSDM literature as well as current challenges and open questions that need to be further investigated in the direction of future research in this field. LSDM stands for latent structural dynamic modeling. A discussion of three p Perspectives that are often used in AI and information fusion approaches as well as unique applications of LSDM literature are presented in this book. Given the exponential growth that has occurred in AI over the past few years, the majority of the conversations that have taken place in this field have centered on the important part that AI technologies should play in furthering LSDM research. As is the case in the majority of instances, it is the time to test these models in actual applications. On a theoretical level, SNA-based techniques are presented across the LSDM-related research literature. This is a sample of translation results obtained using SNA. Perhaps the social media and online communities are highly interesting domains. In conclusion, artificial intelligence is founded on the integration of data and an overview of novel application. The main issues of LSDM research and potential prospects for future research are not limited to a merely systematic point of view.

Artificial Intelligence challenges

Artificial intelligence is a subfield of computer science that focuses on the recognition of speech, the solving of problems, the acquisition of knowledge, and the planning and programming of intelligent computers that

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mimic human behavior. There are virtually few laws or regulations that address the specific difficulties that are created by AI, with the exception of several state laws relating to vehicles and drones. The legal culpability of the defendants has been determined by the court. In the second part of this series, we will investigate the aspects of AI that pose difficulties for regulatory agencies. How to define artificial intelligence. There are other obstacles to overcome in the real world, one of which is the inherent difficulty of managing the activities of autonomous robots. Some of these issues are ideological in nature, such as the question of how AI systems should behave in situations in which moral and legal duty are at stake, which may be the reason why the previous order was unsuccessful. Because AI systems are associated with the risk of performing unforeseen acts for the possibility of being constructed in a highly hidden or ubiquitous manner, effective antecedents cannot be imposed and therefore cannot be effective. In spite of these obstacles, the extensive regulatory toolkit that the legal system provides alludes to the There are other difficulties in practice, such as the inherently tough task of controlling the behavior of autonomous robots. There must already be regulations in place that are effective for AI. feasible. In consideration of these difficulties and capacities, Part IV will present the recommended framework that is based on the many DART responsibilities associated with the AI regulation. Crucial to the The AI certification procedure would provide as the regulatory framework. Manufacturers and operators of certified AI systems would have limited DART liability, whereas those operating non-certified AI systems would have significant liability. The increasingly important role that AI is playing in both the economy and society poses problems to the legal system, both practically and ideologically. The underlying problem of AI recovery, system reconstruction, and control of the operations of autonomous machines gives rise to several practical obstacles. These challenges include: The use of machines and, more specifically, Identify the issues that are linked with the usage and impact of revived AI-based systems for decision making, and give a set of research ideas for the people who study information systems. More than six decades have passed since the introduction of artificial intelligence. In recent years, improvements in artificial intelligence have been made possible thanks to the growth in supercomputing capacity and big data technology. The next generation of artificial intelligence is evolving at a breakneck pace and has once more become an appealing study topic. The reason for writing this post is to serve as a The purpose of this article, which is written at the research-level, is to investigate the Identifying problems and information systems research opportunities for researchers connected to the application and impact of new generation AI-based systems. In this section, we will explore the difficulties as well as the research prospects. The capacity for learning and growth that is built into AI-based human intelligence is a distinct advantage of this type of intelligence. in keeping with the fresh surroundings and the new difficulties. Cleaning up and improving the quality. Performance through ongoing learning will remain the primary obstacle for Advertising Wansing AI until deep learning and the most recent developments in Big Data are implemented. A look at the systems for decision-making in the era of big data from the point of view of their applications and impacts. Because the development of AI and its applications span such a wide variety of domains, the paths that research will take in the future may diverge. This article provides a summary of recent happenings in the field of artificial use. The application of intelligence in the medical field has been created, and its

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potential is currently being investigated. Many examples can be found in published Within the context of this piece, artificial intelligence (AI) is understood to refer to the capacity of a machine to mimic intelligent human behavior. Qventus is an artificial intelligence (AI)-powered software platform that handles operational difficulties throughout the hospital, especially those seen in emergency rooms. Many dictionaries and academic studies have contributed their own definitions of what artificial intelligence (AI) is. Important working areas and medical care for patients Upgrades Quentus Hospital. In addition to these difficulties, which were brought about by the extremely high number of sensors, yet another difficulty was brought about by them. variety, to include compression Sensors in the mix. sensors that are both vector and multimedia based. Applications of the internet of things that offer helpful services must have sensitivity as well as an awareness of complicated surroundings as their foundation. In spite of this, the following difficulties call for more work to be done in order to address a wide variety of nuances: the glaring inequality Proposals, both positive and negative, the front face, as well as obstructions and ambiguities in profile and movement. It establishes the fundamental basis for face detection. The Viola-Jones algorithm is one of the most well-known and widely used traditional procedures.

Natural Language Processing

3. In recent years, it has experienced a level of growth that is unmatched in the realm of research and development in the related fields of natural language processing and in-depth learning. Created from scratch. These areas of research have a significant amount of zealousness. Computing devices that are both inexpensive and varied in type The various applications of these scientific subfields Data collecting is made as straightforward and enlightening as it possibly can be thanks to specialized areas of study within artificial intelligence, such as computer vision and natural language processing. At the same time, sub-disciplines within the field such as machine learning and deep learning help to construct agents that can process information in an informed manner so that the conclusions that are derived are as accurate as they possibly can be. It conveyed these intellectual systems to the people by giving mechanisms for human languages to communicate with these intellectual systems. In some aspects, it can be regarded to be a natural language process. The study of natural language processing is considered an intermediate level subject. The study of languages with computer science. Processing natural language is another essential component of artificial intelligence. Natural language processing (NLP) Making an effort to increase the computer's capacity. Comprehend spoken or written language produced by humans. S The assignment is brought to a successful close in Section VI, which provides a summary of the data collected from the preliminary test campaign and a discussion of the future path for enhancing this research. In particular, we were instructed on the use of a variety of natural language processing methods, each of which is founded on a different model of artificial intelligence. The techniques of natural language processing, fundamental complementary artificial intelligence, and unsupervised machine learning are broken down in further detail. In Section V, we will discuss the tools that we have chosen to use in order to carry out preliminary tests in two case studies. These case studies will represent the Healthcare

Department and the Justice Domain, respectively. Nicknames pertaining to technology are assigned to certain domain resources. Because of this, we found ourselves starting in the corpus of unlabeled texts, searching for important information, and encrypting it before moving on to build the equivalent tagged corpora. It has the potential to offer assistance to working human specialists in the protection of their privacy. In the end, we conducted an initial test of our campaign. The health agency only provided 10,000 of its documents for review. The proposed approach is basically comprised of Natural language processing is predicated on methods of learning that are both unsupervised and transferrable. It also operates on the presumption that external domain knowledge does not exist in the same form as sub-resources. To locate and highlight significant material inside a written document. Natural language processing, in-depth learning techniques, and machine learning methods are used by artificial intelligence to acquire essential knowledge in a specific domain. This is done as a means of evaluating the value and technical benefits of patent documents. Artificial intelligence may be used. Manual patent abstraction is a time-consuming, difficult, and subjective procedure that, as the size of the patent knowledge domain expands, becomes costly and unsuccessful. In this part of the article, we conduct a literature study on the latest advancements and application trends in artificial intelligence, natural language processing, and automated text. Abstraction The intelligent patent abstraction process primarily makes use of these approaches and algorithms as its primary implementation techniques. The objective of the natural language processing method is to convert human language into a representation that is organized and legible by machines. NLP op operates in two ways. The creation of representations that are readable is one method that the computer makes use of inputs from human natural language expressions. A human language expression can also be created by a machine, but this time it will be generated by the computer's internal system codes. Data extraction, machine translation, text summarization, key word searching, and human-computer interfaces that make use of natural languages are all examples of NLP applications. The science behind technological advancement is known as A computer system that investigates or investigates how a natural written language might have a meaningful interaction between a computer and a human in a particular field of application. Also known as "natural language processing." Processing of natural language is the name given to this branch of linguistics. In the field of NLP research, several people have proposed writing in other languages, including English.

Explainable Artificial Intelligence (XAI)

4. Machine translation by means of continuous neural networks is one example, while image categorization by means of a modified neural network is another. Interest in learning has been sparked as a result of research on reinforcement that was published by Google DeepMind. Several courses of action have been proposed across numerous articles. Arrangements for recording descriptions and title-describing descriptions The ML Research Community is home to numerous DL libraries that are widely used. The field of artificial intelligence has recently

emerged as an important focus. Been launched. Add your explanation of the tensor flow. A great number of papers have proposed various courses of action. Structures have been put in place to capture interpretation and title-explaining, and these structures have been launched. To better show the flow, include their very own XAI libraries, such as Pytorch Captum and Tensor. Monitoring evaluation criteria as a means of explaining multiplication is also beneficial to the ML community. The application of algorithms and methods for making them more useful are discussed. This perspective centers on Explained Artificial Intelligence, which in recent times has been recognized as a significant necessity to follow ML approaches in real-life applications. ML methods have been highlighted as a big need to follow. Our research paper number 46 provides an illustration of this topic, elucidates the many concepts that are based on the model description, and exhibits numerous aims that support the search for more descriptive ML methods. These ideological concepts served as a solid basis for a systematic review of the recent literature on interpretation, which was approached from two different perspectives: 1 ML models with some degree of transparency, thereby being self-explanatory; And 2 Techniques designed to make post-temporary XAI ML models more descriptive. An explanatory artificial intelligence structure is offered as a solution to these challenges. The objective of this structure is to provide a global and local explanation of the sub-diagnosis of hepatitis while simultaneously maintaining strong prognostic performance in this study. To begin, a broad hepatitis categorization derived from the UCI is put to the test in order to determine whether or not a criterion structure is even possible. Following that, explicit and black box machine learning models were utilized in order to make a prediction regarding the progression of hepatitis. Similar to Logistic Recursion, the black box model provides support for the vector. The selection is done by machine using a random forest. In conclusion, the model description of liver illness is improved by using Shapley combination descriptions, local descriptive sample-cognitive explanations, and partial dependent layers. The findings of experiments indicate that complicated models perform significantly better than simple ones. In an urban setting, there is an immediate demand for sustainable measures that might mitigate the negative effects of the energy used for transportation. Forecasting of the energy sector We propose a transport energy model that that may be used to anticipate the amount of energy that is consumed by house traffic. The models employed in this research that make use of artificial intelligence technologies provide vital information. Estimating the amount of energy used by house traffic is done with the help of data-based methods using the TEM model. Techniques based on machine learning have recently gained popularity in the field of artificial intelligence predicting modeling of hypothetical dynamics. It might be difficult to instill faith in AI models and the forecasts they provide. AI models are typically more complicated and provide fewer explanations; both AI models and their forecasts might be difficult to understand. AI models These were utilized in an effort to gain a better understanding of the significance of predictive variables in individual and overall survival estimations. Process That Led to the Achieved Results Knowledge Gain and Expert Knowledge

Verification, Highlighting the Large Capacity of Data-Motivated Models in the Industry Illustrate the Need for Cooperation between Processes and Experts Knowledge Gain and expert knowledge verification, highlighting the large capacity of data-motivated models in the industry Those with expert knowledge and interpretive capabilities provided by artificial intelligence Methods for comprehending more complex versions of machine learning models.

Conclusion

Benefit refers to any condition, circumstance, opportunity, or means, especially the result that is favorable or desired for success. This word can be applied to any display of machine properties related to the human mind. The difference between good and evil is that evil is a weak or undesirable trait. Although our traditional education has not been entirely turned into AI, the terrain is currently being transformed and remade by the AI system. It is erroneous to think that AI can completely transform how people connect with one another. This page offers information that Includes three unique life cycle phases relating to one or more tasks that need to be considered by AI: design, control, and maintenance. These phases are included. We will be able to improve these transactions and deliver better services to our consumers if we can teach computers to think in the same way that people do. This results in them becoming superior computers. We report the sources as representatives of the medical industry after conducting an assessment outside of the Department of Orthopedic Surgery. In recent years, it has experienced a level of growth that is unmatched in the realm of research and development in the domains of related fields such as natural language processing and in-depth learning. Created from scratch. These areas of research have a significant amount of zealousness. Computing devices that are both inexpensive and varied in type The various applications of these scientific subfields Data collecting is made as straightforward and enlightening as it possibly can be thanks to specialized areas of study within artificial intelligence, such as computer vision and natural language processing. Estimating the amount of energy used by house traffic is done with the help of data-based methods using the TEM model. Techniques based on machine learning have recently gained popularity in the field of artificial intelligence predicting modeling of hypothetical dynamics. It might be difficult to instill faith in AI models and the forecasts they provide. AI models are typically more complicated and provide fewer explanations; both AI models and their forecasts might be difficult to understand. This perspective centers on Explained Artificial Intelligence, which in recent times has been recognized as a significant necessity to follow ML approaches in real-life applications. ML methods have been highlighted as a big need to follow. Our research paper number 46 provides an illustration of this topic, elucidates the many concepts that are based on the model description, and exhibits numerous aims that support the search for more descriptive ML methods. This results in them becoming superior computers. We are reporting the evidence as the medical practice was being investigated by a different department from the one that handles orthopedic surgery.

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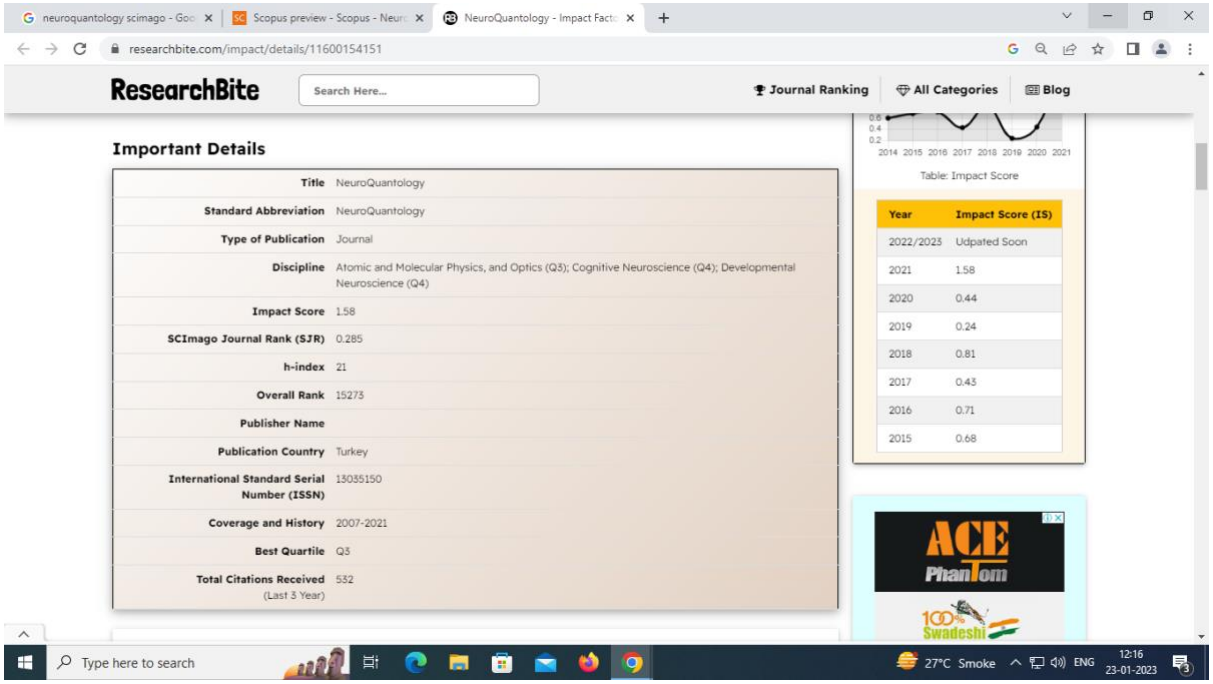

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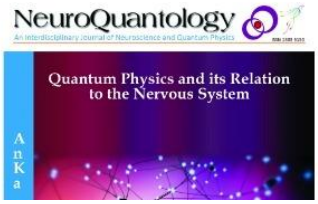

Design Engineering

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Waste Segregation of Degradable Solids to Promote Recycling Using Hybrid Convolutional Neural Network (Cnn) + Multilayer Perceptron (Mlp) Method

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Abstract: Waste segregation, in layman's terms This includes dividing trash into dry and wet categories in simple words. Human garbage is piling up in landfills, and scavengers are frequently compelled to go through it physically, which is very hazardous to their health. Using a high-tech computerized automatic waste segregation technique, recyclable rubbish may be sorted at the user's location. There are a variety of ways for determining the kind of rubbish in a given area. Neural Networks (NN), Convolutional Neural Network (CNN), Faster Recurrent Convolutional Neural Network (R-CNN), and Neural Networks (NN). New waste segregation algorithms are developed using a Hybrid Multilayer Convolution Neural Network (HMCNN), a hybrid of CNN and MLP, after assessing the present approaches. This algorithm is based on CNN and MLP. A type of artificial intelligence known as convolutional neural networks (CNNs) has triggered a revolution in video processing since it is the most advanced image identification and categorization system. Images may be classified and identified by using Convolutional Neural Networks (CNNs). In a typical CNN, convolutional, pooling, and dense layers all work together. A feed-forward learning artificial neural network known as a Multilayer Perceptron (MLP) (ANN). Back propagation, a supervised learning approach, is used by MLP when it comes to training. Unlike a linear perceptron, the MLP has many layers and non-linear activation. Imager, sensor, and classification systems comprise this Multilayer Hybrid System's three main components (MHS). According to the results of this study, the suggested approach has the potential to improve waste separation efficiency and effectiveness.

Keyword: Waste segregation , Neural Networks (NN), Convolutional Neural Network (CNN), Faster Recurrent Convolutional Neural Network (R-CNN), Tensor-Flow Object Detection Application.

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I. INTRODUCTION

An estimated $375.5 billion will be spent on managing the world's yearly solid waste by 2025. The economy, public health, and the environment would suffer greatly if appropriate waste management is not implemented. The Environmental Protection Agency (EPA) has ranked municipal solid waste (MSW) recycling as the second "most ecologically sound" technique for dealing with urban garbage (EPA) For both economic and environmental reasons, efficient trash recycling is essential. It may aid in the recovery of raw materials, the preservation of energy, the reduction of greenhouse gas emissions, water pollution, and the reduction of new landfills. The following are the main difficulties to garbage recycling: The lack of government regulation and budget for MSW management, the lack of household education about the importance of self-waste recycling, the lack of effective recycling technology, and the high cost of manual waste classification are all factors that contribute to a lack of self-waste recycling.

Computer vision has advanced at an unparalleled rate thanks to recent advances in deep learning. Image classification, segmentation, and detection are some of the most common uses of convolutional neural networks (CNNs). Therefore, CNN has been offered as a method for Waste categorization in this literature.

The Contribution and organization of the paper is main motive and objective for developing the proposed model is represented as follows,

- This paper presents a novel architecture for simulating the physiological and conceptual processes that occur during human examination. The majority of current trash sorting technologies rely solely on photographs as their only input source.
- To employ Alex-Net CNN to behave as "human eyes" in order to visualize and retrieve desired crucial picture characteristics from its final dense layer, which will be visualized and extracted using Alex-Net CNN.
- To utilize sensors to function like “ears” and “nose” to recognize relevant numerical feature information. Ultimately, Multi-Layer Perceptron (MLP) functions like a response center (human brain) to segregate the trash entities by gathering data gained from multiple sources.

According to the design, sections 2 and 3 will focus on articles that are connected to the proposed system. Section 3 will provide a full explanation of the suggested model. Detailed instructions for implementing the proposed system may be found in Section 4. Section 5 will detail the findings of an experiment based on the suggested system, which will be carried out. Section 6 will be the last part of the paper.

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II. LITURATURE SURVEY

The area of e-learning has been the subject of a large number of studies. There have been several developments in e-learning and recommendation systems. In the next part, we'll go through some of the Proposed-related techniques.

Pooja Shela et.al [11], as mentioned in, the municipal web server will be instructed to clean dustbins instantly with correct verification based on the degree of garbage loading. Using an ultrasonic sensor coupled to an Arduino UNO, the approach is able to monitor the amount of rubbish in the bin before it overflows, and then notify the municipal web server when the bin is overflowing. After cleaning the bin, the driver checks his work using an RFID tag and makes any required modifications. In this situation, RFID is being utilized as a kind of authentication.

M.S.Killedar et.al [11], Send their results to a journal for publication. A microprocessor, an infrared sensor, and a Wi-Fi module are used to build a smart trash management system. Once trash hits its peak, their method ensures that dustbins are cleaned as quickly as possible before the amount of rubbish decreases any more. Trash bins that are left unattended for an extended period of time will be reported to the authorities. As a result of this method, it is possible to eliminate corruption in the organization by detecting false reports. As a consequence, the total cost of rubbish collection is reduced since there are fewer waste collection trips. In the grand scheme of things, it helps society's attempts to keep its environment clean. With the intelligent waste management system, the amount of trash that can be collected has been increased. It is possible to steal system components from these systems in a variety of different methods, all of which need countermeasures.

Kavya Balakrishnan et al.[13], to use a technique they explain in their post to show how to tell the difference between three types of waste. The Arduino UNO board can also control metal components in addition to plastic and biological components. In addition to the Arduino Sensor, the system also includes ultrasonic sensors, inductive proximity sensors, DC motors, a blower, and an electromagnet. Plastic, biological, and metallic garbage are all separated throughout the trash segregation process. Waste segregators are the machines used to do this. Using the suggested system, the whole solid waste collection process would be supervised and managed from beginning to end. There is an opening/closing mechanism in the machine's input section to control the flow of waste.

Abdul Kadir et al. [14], Developed a system that pays customers depending on how much waste they put in a container and what sort of waste they place in the container. The system calculates points based on how much waste is deposited and what kind of trash is deposited in the container. Because it deducts user points if the kind of garbage input does not match the type of dustbin, this strategy eliminates the need for human sorting of trash from the process. Under contrast, the task of defining what constitutes rubbish is still in progress. Furthermore, there is no effort being made to

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address the issue of garbage collection in the immediate future.

R. Rajkamal et al. in [15], designed a technique that could be executed automatically because these materials can be recycled for energy generation, the quantity of garbage that ends up in landfills may be reduced as a result. Modern technology has made it feasible to commercially develop dry trash sorting systems that separate rubbish into categories such as paper, plastic, metal, and glass. These systems are used to separate garbage into categories such as paper, plastic, metal, and glass. The failure of these segregation strategies is ultimately due to the uncontrolled mixing of rubbish that occurs at the time of collection. However, even if all of the waste has been separated, it is likely that contamination will have an impact on the quality of the items that have been separated. For example, the GREEN BIN does not allow for the mixing of dry and wet rubbish, nor does it allow for the disposal of food waste in the same container.

Abdullah et.al [16] Based on empirical research, has developed the Technology Acceptance Model (TAM), which defines the external components of a meta-analysis within the context of e-learning and is based on a meta-analysis. Consequently, based on the results of the research, the most often reported external effects of TAM were subjectivity and pleasure, computer fear, self-efficacy, and experience, with the experience ranking highest among these effects. A number of the outside impacts were employed in the two basic constructs of the TAM, which were the perceived utility (PU) and the perceived simplicity (PS) (PEOU). These constructs were explored in the context of the creation of e-learning technology and the application of that technology to a variety of different user types, respectively. The students that participated in e-learning approaches had higher levels of self-efficacy, as judged by enjoyment, lower levels of computer phobia, and more prior experience. The subjective norm, self-efficacy, and experience are the elements that predict pleasure in the e-learning approach, with the student having the greatest predictive enjoyment of the PU technique, according to the research. It seems from the outcomes of this research that the acceptability model for e-learning may be improved via the use of new technology.

Waste management in India has become more difficult to manage as a result of the significant expansion in urbanization, industry, and population that has occurred during the last two decades. References [7] and [8] provide evidence of the model's support for the common waste management paradigm. According to the Globe Bank, waste management systems and infrastructure account for between 20 and 50 percent of municipal budgets throughout the world each year. According to the author's presentation, the ISWM plan comprises of a baseline of information, recommended goals, concerns, management system responses, an implementation strategy, and monitoring, as well as information that feeds into the system. Using a GSM-based electronic monitoring system, Reference [10] designed a system that can send an SMS to a supervisor when the trashcan is completely full. This enables the system to dispatch a garbage truck to pick up the rubbish on your behalf. It is necessary to send yet another text message to the supervisor, this time advising him of

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the day and hour of garbage collection. The trashcan's state, including whether or not it was full, was communicated through a GSM module installed in the dustbin. An ultrasonic sensor was utilized to determine how much garbage was in the dustbin, which was then used to send out messages. A smart trashcan interfaced with a GSM module and an ultrasonic sensor was proposed for waste collection in [11], and the author finished the paper by discussing issues related with smart dustbins, such as the cost of the device, maintenance requirements, and durability. This project develops a garbage collection system that makes use of a camera, an Arduino UNO, and an Ethernet module to connect to the internet through the Blink programmer in order to collect rubbish from hard-to-reach locations in a city. Each and every communication between the different parties involved is handled entirely by the Blink coder. The ultrasonic sensor keeps track of how much waste is in the dustbin and cleans it as soon as the level reaches a certain threshold [12] [13] [14, 15]. A prototype of an intelligent trash system based on the Internet of Things was presented by [14] for the city of Chicago in the year 2017.

III. METHODOLOGY

In this model, an improved CNN (i.e. CNN+MLP) is developed for each of the six mother-classes that are reliant on cardboard, glass, metal, paper, plastic, and waste. It is difficult to detect a class that does not exist while using six convolutional neural networks, one for each mother class in the dataset. Assuming that the mother class is fully composed of cardboard, it's reasonable to assume that both the kid class and the father class will be entirely constructed of plastic bottles. Initial processing involves submitting the picture to the Improved CNN, which provides a bounding box as well as a class hierarchy based on the image data. The original picture is cropped using one of CNN's inputs that pertains to the mother-class hierarchy. Once the child class had been formed, it was combined with the mother class to form the final class that was used. Prior to identifying the model, the result is predicted using the bounding box as a starting point. The model's mechanism is shown in Figure 1.

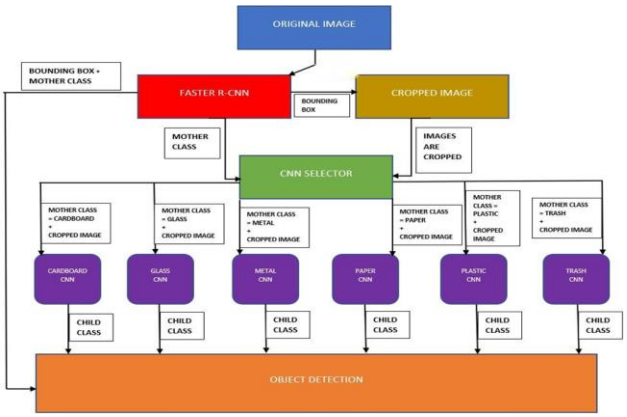

Figure 1 Waste Classification Architecture Using an Improved CNN Model

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Training Data may be created in two ways: by adding annotations to pictures using the Label IMG tool and creating TF records [34]; or by converting XML files (annotations on images) to CSV files (conversion of XML files to CSV files) (containing all of the data for the train and test images). Following the acquisition of training data, label maps are constructed, which specify a mapping of class ID numbers to class names, notifying the system as to what each item is. In order to assist identify which parameters and models will be utilized for training the object identification pipeline, it is necessary to first establish a label map. As soon as the training pipeline had been properly established and configured, Tensor-Flow started initializing the model training process.

"To successfully train a large network, you'll require a significant amount of computer capacity," according to Faster R-CNN. The laptop we utilized was a DELL with an Intel i5 CPU and an NVIDIA GeForce GTX 1050 Ti graphics processor, which we used to prepare the data (GPU). The CUDA® deep neural network library CUDNN SDK and the compute unified device architecture (CUDA) Toolkit were used as extra software requirements on the Windows 10 computer." (CUDA) Toolkit was used as an additional software prerequisite. When it comes to doing high-performance mathematical computations, the open-source Tensor-Flow GPU version 1.4.0 software is used in combination with the Python version 3.7 programming language. Because of its modular nature, it is simple to deploy calculations over a variety of stages and timeframes. The software's whole setup procedure is shown in Figure 2.

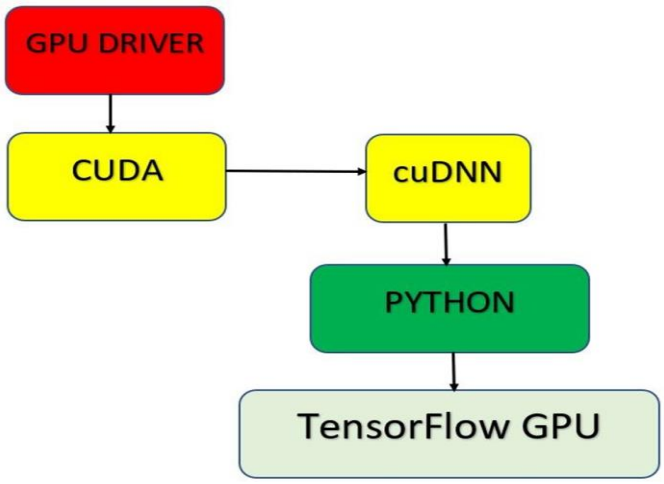

Figure 2 Setting Procedure of the Software

3.1. Architecture of Hybrid Implementation

We create a dynamic Classification approach for binary classification that classifies records into various types of garbage based on the content of the records. The proposed CNN-MLP architecture is shown in Figure 6.1, which offers a high-level overview of the proposed architecture. To simplify the architectural process, it is possible to divide it into two stages: design, and building.

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The former, which consists of a succession of CNN layers, is used to conduct a study of the activation functions and the extraction of intermediate properties from them. These intermediate characteristics are then sent through to the following MLP or fully connected layer, which is in charge of processing the final output characteristics. A 2-dimensional matrix structured in picture format must be provided as input to the CNN algorithm; otherwise, the algorithm will fail.

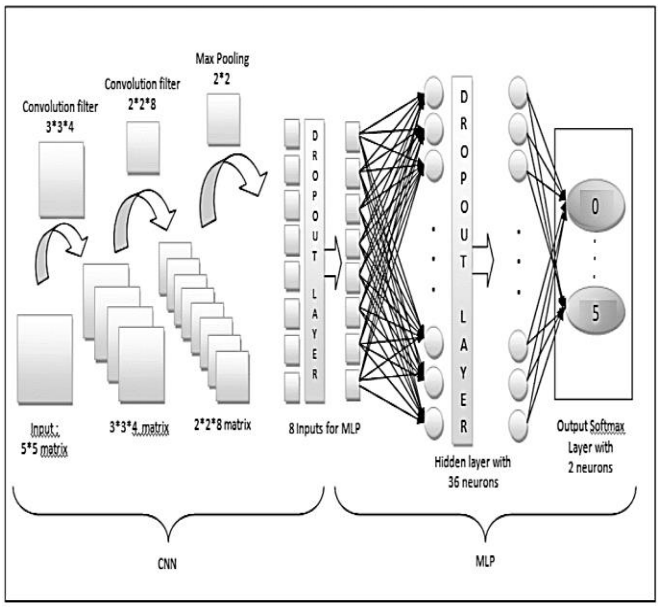

Figure 3: Architecture for Hybrid Multi-Layer Convolution Neural Network

When applying filters to an input matrix, convolutional layers are employed to do so by switching them on and off at regular intervals throughout the matrix, resulting in the construction of a new, smaller-sized matrix from the original input matrix. It then goes on to include a series of "Max-pooling layers," which take the maximum amount of information possible from their window/filter size and use it to create an even smaller matrix than the one formed by the prior set of Convolutional layers. The final output of the CNN layers is flattened so that it may be used as the one-dimensional input for the MLP layer at the conclusion of the process, which is where the procedure ends. Several architectural features, including a buried layer and an outermost Soft-Maxs layer, are used to complete the architecture's design.

"Regularization is typically necessary in deep architectures in order to prevent over fitting difficulties, and dropout layers are implemented in order to make the system more resilient as a consequence of this necessity," according to the authors. By comparing two feature sets in the preprocessing step, we demonstrated how we obtained our 25 features in the postprocessing stage. In order to arrange these 25 features, they are grouped into a 5*5 matrix, which is used as the input to the first convolutional layer, which has a filter with the dimensions of 3 * 3 * 4, and provides an output with the dimensions of 3 * 3 * 4.

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Using the appropriate stride at each layer is critical in order to guarantee that the input dimensions are compatible with the filters that have previously been applied to the layers below them. Using a convolutional filter with two layers, a 2*2*8 convolutional filter is applied to the output of the first layer of the 2*2*8 convolutional filter, resulting in a final output with two layers and two representations. Following that, there is a max-pooling layer, which reduces the level of dimensionality and produces an output matrix of 1*1*8, which picks the highest possible value from among the four potential values available in the range of values to be utilized, reducing the amount of complexity even more.

Inside the dropout layer, which is positioned immediately after the viewership layer within the following layers, it has been programmed to drop out at a rate of 0.25. The output of this dropout layer is flattened into a 1*8 vector, which is then flattened one more in the next phase. The input layer of the MLP architecture is represented by this one-dimensional vector, which is the first layer of the architecture and is the first layer of the architecture. The buried stratum of the MLP has 36 neurons, which is a significant amount when compared to the total number of neurons in the brain. As seen in the image below, a dropout layer is added after this to increase the system's resilience by setting the dropout rate constant to 0.5, as shown in the diagram below. Following that, the system is subjected to a series of tests.

It is the multilayer perceptron, which contains two neurons and is responsible for completing our binary classification issue from the previous section, that serves as the output layer. In the convolutional filter, we "used the Rectified Linear Unit (ReLU) activation function" since it requires the least amount of power and resources while still ensuring that the filter converges to a stable solution with high accuracy.

Due to the fact that binary classification will be performed using the sigmoid activation function in MLP layers, the sigmoid activation function is required for this study. The Loss Function Back-propagation technique, which is a variant of the gradient descent process, may be used to modify the weights of the associated links between neurons in a network in order to increase their overall performance and effectiveness. From 0.1 percent to 0.90 percent, we undertook trials with different learning rates in order to see what would happen. The most convincing findings were achieved by maintaining the rate constant at 0.5 percent over an extended period of time.

IV. Result Analysis of Hybrid Approach

With more than 500 data examples, the MHS model is trained and tested under varied situations: “the item is placed with fixed orientations and the item is placed with random orientations”. The model's performance is compared to that of a number of other models that use solely photos as their only source of information. Presented in Table 11 are the categorization results obtained from each of the models.

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Following the evaluation findings shown in Table 11, it can be concluded that MHS surpasses the CNN-only model on all three matrices viz. accuracy, precision, and recall, with the exception of the "others" category, which shows a considerable improvement.

Table 1 - Classification Report for Hybrid Classifier

	Precision	Recall	F1-score	Support
0	0.97	0.95	0.97	806
1	0.98	0.96	0.98	1000
2	0.99	0.97	0.99	818
3	0.99	0.98	0.99	1188
4	0.99	0.99	1	968
5	1	1	1	274
Accuracy			0.99	5054
Macro average	0.98	0.98	0.99	5054
Weighted average	0.99	0.99	0.99	5054

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 6, 6, 96)          34944
_________________________________________________________________
activation (Activation)      (None, 6, 6, 96)          0
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 3, 3, 96)          0
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 1, 1, 128)         307328
_________________________________________________________________
activation_1 (Activation)    (None, 1, 1, 128)         0
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 1, 1, 128)         0
_________________________________________________________________
zero_padding2d (ZeroPadding2 (None, 3, 3, 128)         0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 1, 1, 384)         442752
_________________________________________________________________
activation_2 (Activation)    (None, 1, 1, 384)         0
_________________________________________________________________
zero_padding2d_1 (ZeroPaddin (None, 3, 3, 384)         0
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 1, 1, 192)         663744
_________________________________________________________________
activation_3 (Activation)    (None, 1, 1, 192)         0
_________________________________________________________________
zero_padding2d_2 (ZeroPaddin (None, 3, 3, 192)         0
_________________________________________________________________
conv2d_4 (Conv2D)            (None, 1, 1, 128)         221312
_________________________________________________________________
activation_4 (Activation)    (None, 1, 1, 128)         0
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 1, 1, 128)         0
_________________________________________________________________
global_average_pooling2d (Gl (None, 128)               0
_________________________________________________________________
dense (Dense)                (None, 4096)              528384
_________________________________________________________________
activation_5 (Activation)    (None, 4096)              0
_________________________________________________________________
dropout (Dropout)            (None, 4096)              0
_________________________________________________________________
dense_1 (Dense)              (None, 4096)              16781312
_________________________________________________________________
activation_6 (Activation)    (None, 4096)              0
_________________________________________________________________
dropout_1 (Dropout)          (None, 4096)              0
_________________________________________________________________
dense_2 (Dense)              (None, 6)                 24582
_________________________________________________________________
activation_7 (Activation)    (None, 6)                 0
=================================================================
Total params: 19,004,358
Trainable params: 19,004,358
Non-trainable params: 0
```

Figure 4: Improved Architecture for Hybrid Multilayer Convolution Neural Network

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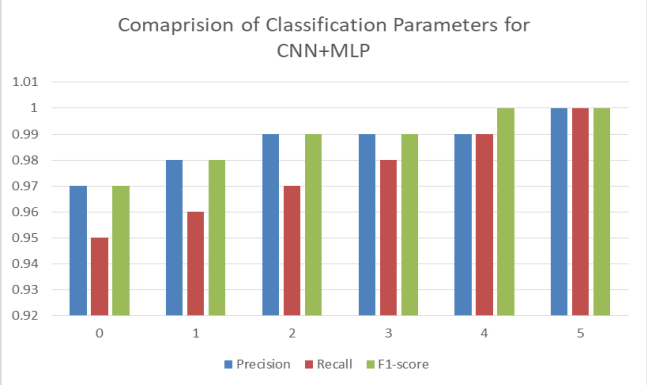

Figure 5: Precision, Recall and F1-Score for Hybrid Multilevel Convolution Neural Network

After discovering that several boundaries were being produced in the area of the object identification during testing, it was decided to decrease the threshold for the forecasting of pictures in order to remove this inaccuracy. When the minimal standard values are surpassed, this assists in the invalidation of the entity's limits, which is beneficial. Figure 6 displays the accurate measurement done by the model, which was created from the ground up from the ground up.

Figure 6: Prediction Result of the Model

Table 2 - Precision, Recall and F1-Score for Different Models

Algorithm	Precision (Weighted Average)	Recall(Weighted Average)	F1- Score (Weighted Average)
RF	0.8	0.8	0.79
SVM	0.7	0.66	0.65
LR	0.71	0.71	0.71
KNN	0.72	0.71	0.71
DT	0.63	0.63	0.63

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LDA	0.68	0.67	0.68
NB	0.59	0.44	0.44
MLP	0.83	0.82	0.81
Hybrid CNN+MLP	0.99	0.99	0.99

Table 3: Accuracy Achieved by different Algorithms

Algorithm	Accuracy (%)
RF	0.8
SVM	0.66
LR	0.71
KNN	0.71
DT	0.63
LDA	0.67
NB	0.44
MLP	0.82
Hybrid CNN+MLP	0.99

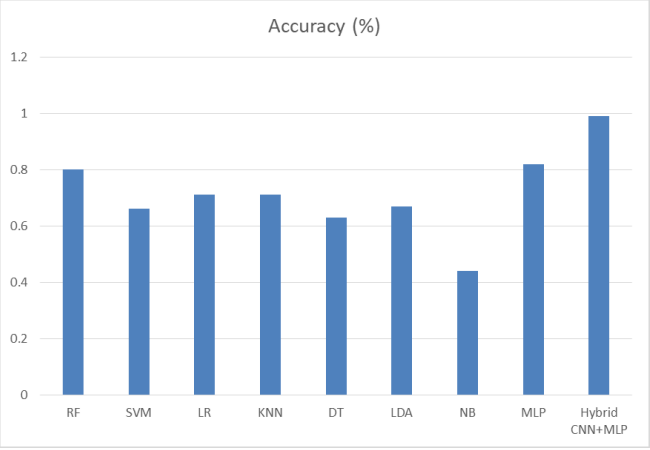

Figure 7: Comparative Analysis of the entire Exiting Algorithm with Hybrid Model

V. CONCLUSION

A multilayer hybrid deep learning (MHS)-based automated classification system is proposed for categorising rubbish disposal in the metropolitan public environment. The system is able to mimic the human sensory and intellectual process system in operation by deploying a high-resolution

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camera in combination with other functional sensors. When using the multilayer hybrid approach, you're dealing with three separate yet interconnected systems. Multilayer perceptrons (MLP) are used in the image processing and numerical sensor systems as well (MLPs). Alex-Net CNN is used to extract visual information for use as inputs to the MLP, which is subsequently used to analyse the picture. Additional waste properties have to be measured by the sensor system in order to provide MLP with numerical data. By incorporating information from both visual and sensory channels, it is used to automatically classify waste as recyclable or non-recyclable.

This research shows how the categorization of waste items into six categories (Cardboard, Metal, Glass, Paper, Plastic, and Trash) using the Faster R-CNN algorithm approach can be achieved on various distinct object categories. utilising the Faster R-CNN algorithm on a range of different object categories may be done with ease. Images may be processed using the Faster R-CNN method for many object types.

.Need to concentrate on performance factors of the users.

Using the suggested MHS to improve waste categorization efficiency and effectiveness has been shown in this research. An ecologically and economically sound MHS has been presented to deal with garbage that is increasing in bulk and urgently needs to be processed in a more environmentally friendly manner.

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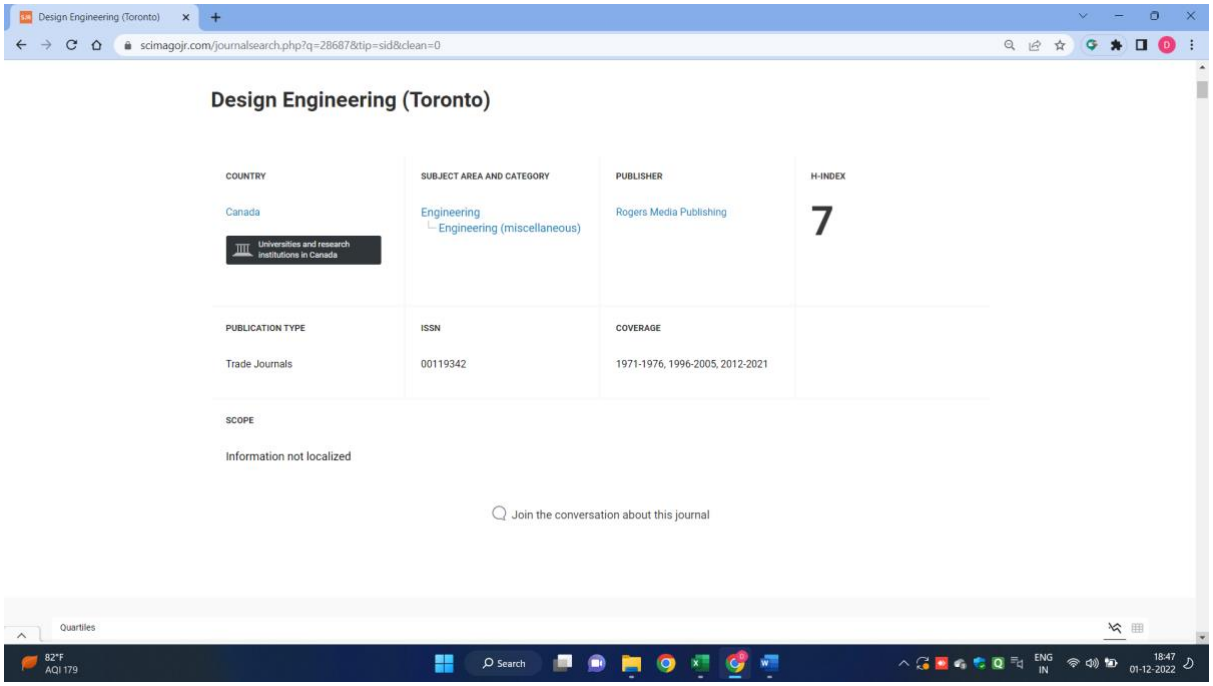
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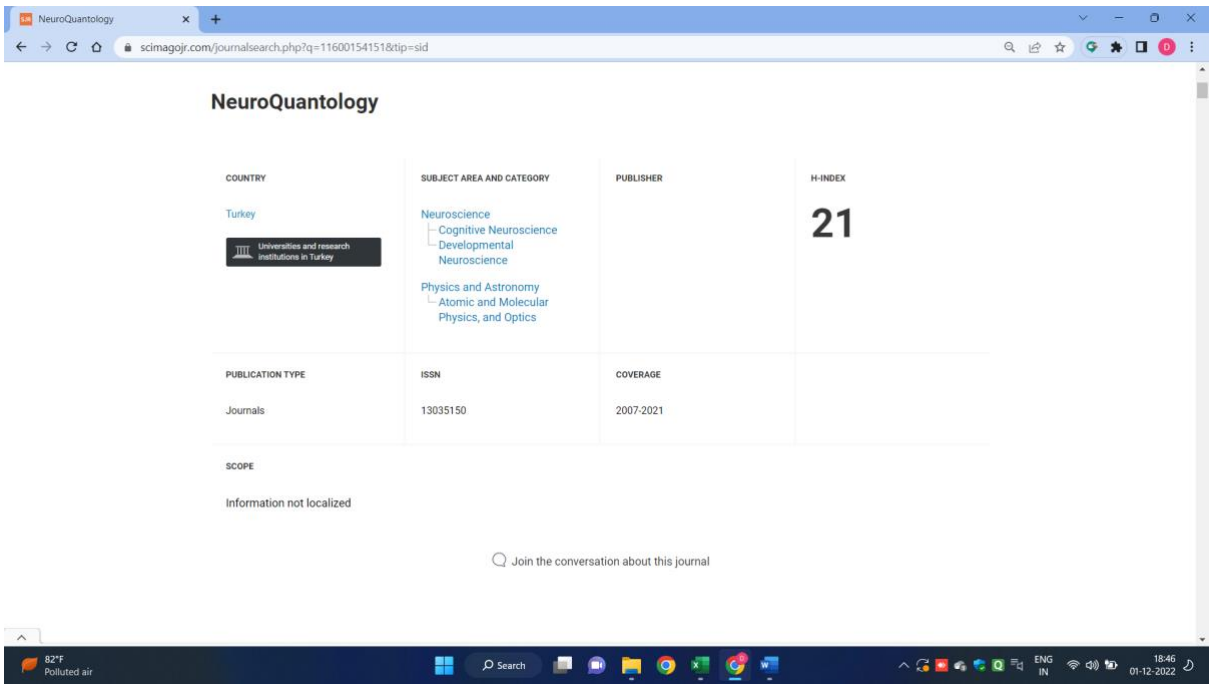
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Morphometric Analysis of Irai River Basin

Chandrapur District,Maharashtra India.

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Abstract:

Measurement of the shape,or geometry,of any natural form-be it plant, animal or relief features is termed Morphometry (A.N.Strahler,1969).Morphometric analysis is significant for investigation and management of the watershed, to prepare a comprehensive watershed development plan it becomes necessary to understand the topography. Erosional status and drainage pattern of the area.This study was undertaken to determine the drainage characteristics of Iari river basin and the area of the basin is 1276 km^2,central India using Geographic SInformation system(GIS) techniques was used in evaluation of linear and areal aspects of morphometric parameters. Such as stream order(Ns) stream length(Lu),bifurcation ration,(R_b), drainage density(D_d) ,The analysis releals that drainage pattern is dendrite and Include a sixth order stream. The stream of lower order mostly dominate the basin, the development of stream segments in the basin area is more or less affected by rainfall, the stream orders of the basin area mainly controlled by physically and lithologicaly condition of river basin area.

Keyword:

Geometry, Morphometric analysis,Watershed, Drainage pattern. Lithological

Objectives:

1. To evaluate linear aspect of morphometrict characteristics.
2. To evaluate areal aspect of morphometrict characteristics.

1. Introduction -:

Land and Water are both the most important natural resources of the earth as life and various development activities depend on it. These resources are limited and their use is increasing day by day due to population growth. Therefore, Sustainable Development of a country like India requires planning, conservation of water resources and better management for its sustainable use, watershed management plays an important role in the conservation of water and soil resources and their sustainable development. Problems of drought, flood, overflow, soil erosion, human health and low productivity can be over come by adopting good watershed management practices.

Horton (1932,1945) has highlighted the need for quantitative geomorphological analysis in water resources management. Many geographers have since developed methods of watershed morphometry (Straher, 1957, Szilard & Singh, 2016; Singh Mustak, Srivastava, Szabo & Islam, 2015; Yadav, Slingh, Gupta & Srivastava, 2014) and more authors used remote sensing and GIS tools in morphometric analysis, Morphometric analysis is an important tool for Sub – Watershed prioritization regardless of Soil map (Biswas, Suahakar & Desai, 1999) Morphometry is a measure of the configuration of the shape of the Earth's Surface and its topological dimensions (Clark,1996). It provides quantitative descriptions of drainage basins that are very useful in studies such as hydrologic modeling, Watershed prioritization, natural resource conservation and management and rehabilitation.

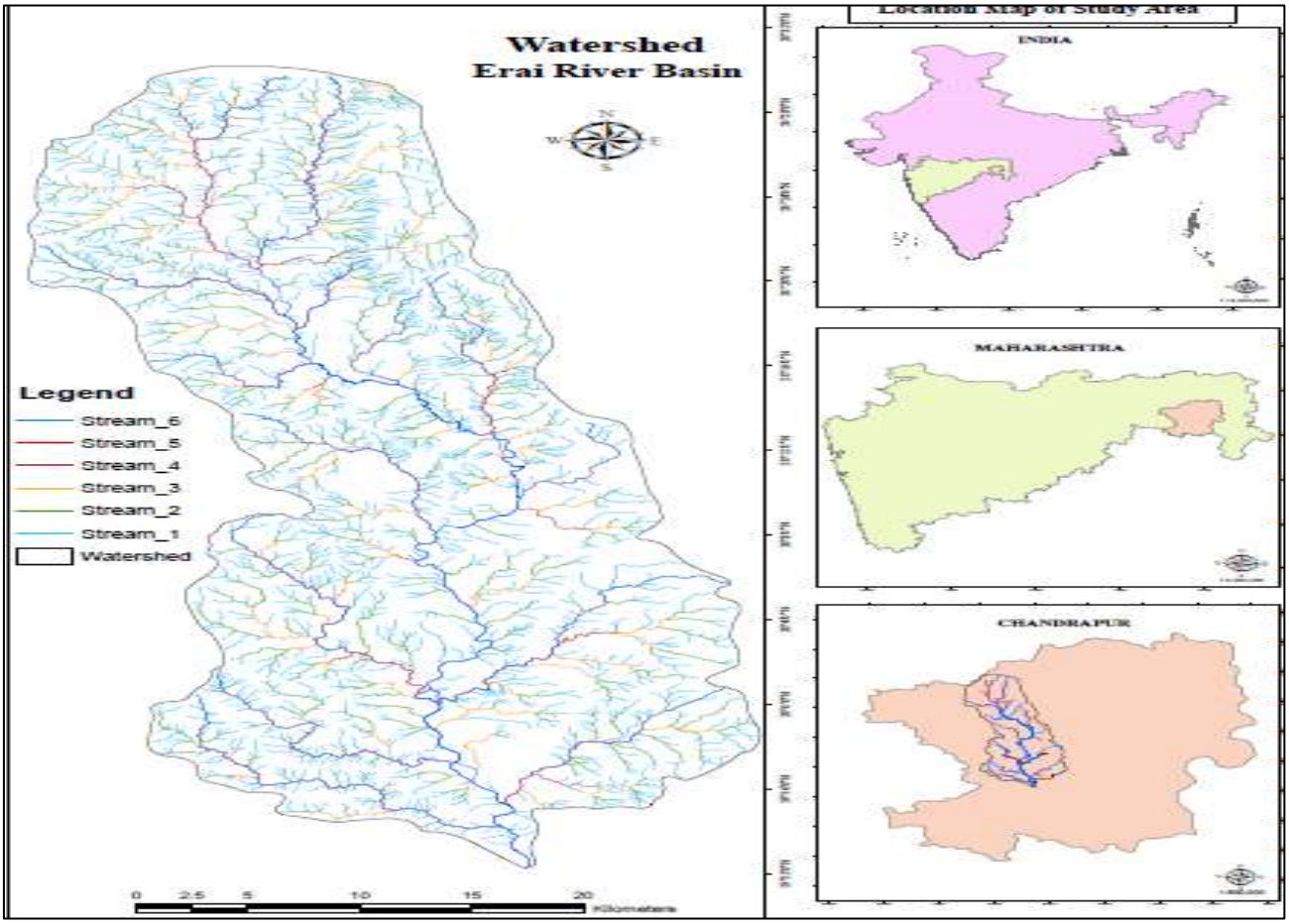
The Literature review suggests that previously drainage morphometric parameters were extracted from either topograthic maps or field surveys with the advent of the High Resolution Digital Elevation Model (DEM); majority of researchers have obtained morphometric parameters from the shuffle Radar Topographic Mission (SRTM), DEM and CRARTOSAI DEM. (Yadav et al, 2014, 2016). These satellite products provide a great way to predict accurate Morphometric parameters due to the sophisticated computer program for any basin in high spatial resolution and fast way.

The Morphometric parameters of any watershed play an important role in Sub – Watershed prioritization, In the present study, Morphometric analysis and primary authentication of sub – Watersheds are carried out for the watershed of Irai River basin in chandrapur district of Maharashtra, India, the objectives of the present study are to derive morphometric parameters like Linear and Areal from DEM using GIS technique.

2. Study Area -:

This study has been done on an area of 1276km^2 in the Irai river valley in Chandrapur District. It is a rivers flowing North to South. The Area of geographically located between 19^{0}45'N To 20^{0}30'N latitude And 79^{0}0'E To 79^{0}30'E longitude. Irai Rive is a tributary of the Wardha River in the Deccan Plateau, The drainage pattern of Irai River is dendritc, chandrapur district has a hot Subtropical and qualities for hyperthermic Soil temperature regien of Geologically the area is covered by the spread of basaltic lava flows.

Map 1- Location map of the study area:-



3. Methodology -:

The topographical maps were geo – referenced in & GIS Software, shuttle Radar Topography Mission (SRTM 30M) data was used to obtain DEM.The entire study area is drawn from (SOI) survey of India toposheet ($55^{P/2}$, $55^{P/3}$, $55^{P/4}$, $55^{P/6}$, $55^{P/7}$, $55^{P/8}$, $56^{M/1}$, $56^{M/5}$) On 1:50,000 Scale.

A Morphometric analysis of the drainage system requires a description of all existing streams, Drainage basins were digitized for morphometric analysis in QGIS 10.8 software, Attributes were assigned to create a digital data base for the drainage layer in the river basin, various morphometric parameters such as liner and areal aspect of drainage basin were calculated, Digitization Work was performed for a complete analysis of the drainage mophometric network, different morphmetric network, different morphonetric parameters have been determined according to the standard method as shown (Table – 1) all the analysis was performed in the Geographical Information system environment with the aid of QGIS software.

1. Table – 1 Formula used for Computation Morphometric Parameters.

Morphometric Parameters	Formula/Defination	References
Stream order(U)	Hierarchical order	Strahler,1964
Stream Length (L_u)	Length of the stream	Hortan,1945
Mean stream length (L_{sm})	$L_{sm}=L_u/N_u$;Where, Lu=Mean stream length of a given order (km), Nu=Number of streams Segment	Hortan,1945
Stream length ratio (R_L)	R_L=Lu/Lu-1 where,Lu=Total stream length of order (u), Lu-1= The total stream length of its next lower order.	Hortan,1945
Bifurcation Ratio (R_b)	R_b=Nu/Nu+1where, Nu=Number of stream segments present in the given	Schumn 1956

	order Nu+1=Number of segments of the next higher order	
Basin relief (B_h)	Vertical distance between the lowest and highest points of basin	Schumn 1956
Relief Ratio (R_h)	R_h=Bh/Lbwhere, Bh=Basin relief, Lb=basin length	Schumn 1956
Ruggedness Number (R_n)	R_n=Bh×Dd where, Bh=Basin relief, D_d=Drainage density	Schumn 1956
Drainage density (D_d)	D_d=L/A where, L=Total length of stream, A=Area of basin	Hortan,1945
Stream frequency (F_s)	F_s=N/A where, N=Total number of stream, A=Area of basin	Hortan,1945
Texture ratio (T)	T=N_1/P where, N_1=Total number of first order stream, P=Perimeter basin.	Hortan,1945
Form factor (R_f)	R_f=A/$(Lb)^2$ where, A= Area of basin, Lb=Basin length	Hortan,1945
Circulatory ratio (R_c)	Rc=4πA/P^2 where A=Area of basin, π=3.14, P=Perimeter of basin	Miller,1953
Elongation ratio (R_e)	R_e=√(Au/π)/Lb where, A= Area of basin,	Schumn 1956

	π=3.14, Lb=Basin length	
Length of overland flow (L_g)	L_g=1/2D_d where, Drainage density	Hortan,1945
Constant channel maintenance (C)	C=1/D_d where Drainage density of basin	Hortan,1945

4. Results And Discussions -The study of basin morphometry deals with the transmission of water and sediment through a basin and stream network geometries, To systematically describe the geometry of a drainage basin and its flow channel, It is necessary to measure the linear aspects of the drainage network. the Areal aspects of the drainage basin, and the relief aspects of the channel network and the contributing ground slopes (Strahier,1964). In the present study morphometric analysis is performed in terms of stream order, stream length, bifurcation ration, Stream length ratio, drainage density, stream frequency, elongation ratio, circularity ratio, form factor etc., Using the mathematical formula given in (Table 1), and the results are summarized in Table (2,3 and 4) . The properties of the flow network are very important for studying the process of land form formation (Strahler, and Strahlar, 2002). Morphometric parameters such as relief, shape and length also strongly influence the basin discharge pattern by different efferent effects on log, time. (Gregory and Walling, 1973).Natural Run – Off is the most powerful geographical agency shaping the area's landscape. The land area the supply small streams of water to the main stream from its catchment area of drainage basin. The flow structure in the drainage system forms the drainage pattern, which in turn reflects the structural or lithological controls of the underlying rocks (Eesterbrooks, 1969).

Map 2 Drainage map of the study Area Showing Stream Ordering

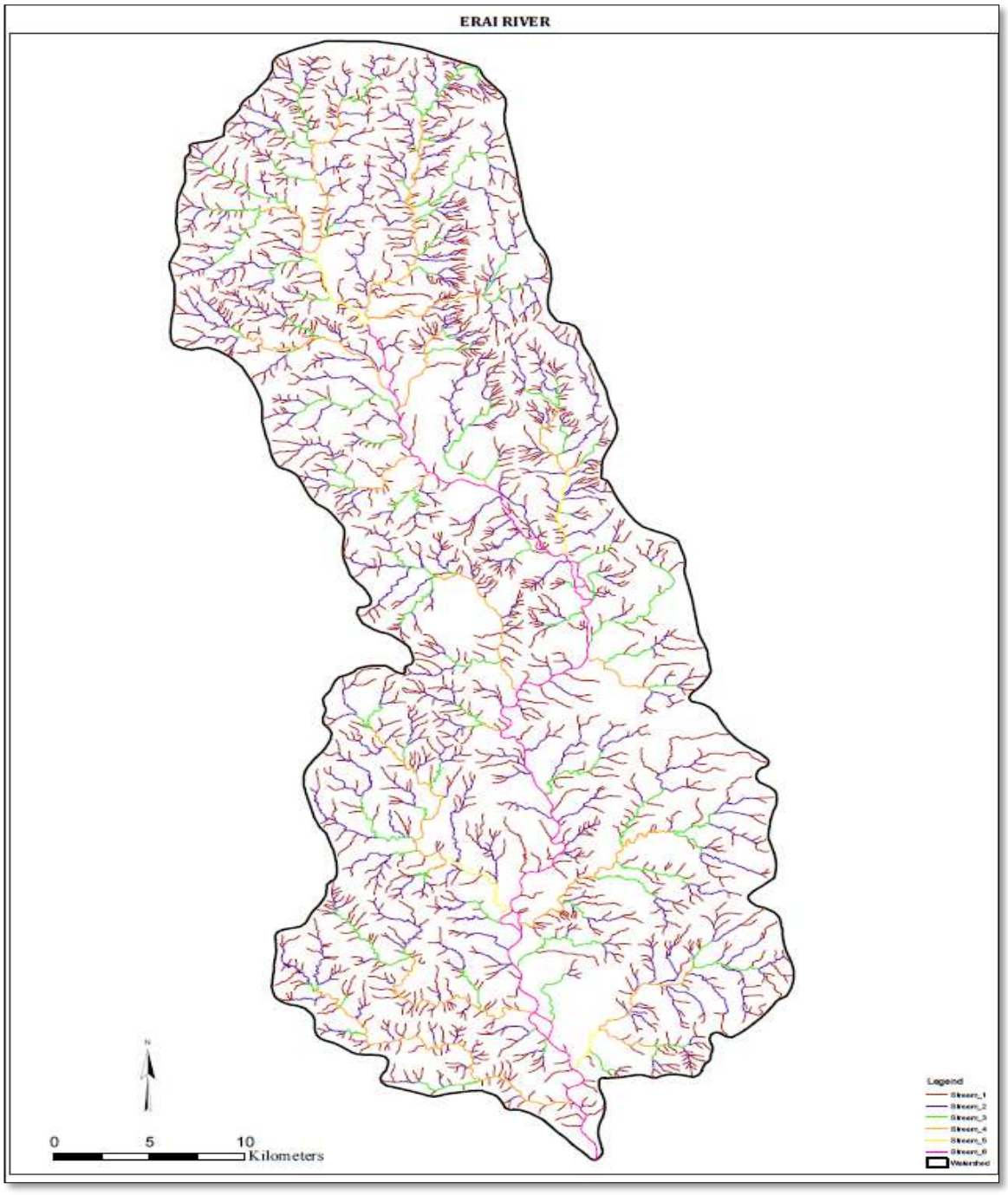


Table 2 Liner Morphometric Parameters of the Irai River Basin :-

Stream Order	Number of Stream Nu	Bifurcation Ratio	Total Length of Stream(Lu) (Lm)	Log Nu	Log Lu	Mean of Bifurcation Ratio (Rbm)
1	1792	-	1265.36	0.71	0.71	5.03
2	402	4.45	530.40	1.31	2.02	
3	103	3.90	253.43	2.46	4.48	
4	22	4.71	167.62	7.62	12.1	
5	5	4.47	22.43	4.49	16.59	
6	1	5.25	79.70	79.7	96.29	

1. Stream Order -

Stream ordering is the first step taken in any drainage basin analysis. In this work the streams are sorted according to the method suggested by Strahler (1964). There are 2325 streams linked with 6 order of streams (Table – 1) spread over are area of 1276 sq.km. The Streams of the Irai river basin have been ranked according to the method described by Strahler (1964) when two 1^{st} order channels give a channels segment of 2^{nd} order. Two 2^{nd} order streams join to form a segment of 3^{rd} order and so on, when two channel of different order join then the higher order is maintained. It is found that Irai river tributaries area of 6^{th} order drainage basin. It is observed that as stream order increases the stream number decreases. Thus the law of lower the order higher the number of streams is implied throughout the catchment.

2. Stream Length –

The length of stream is the most important variable in a drainage basin. The stream lengths of Irai River basin were calculated based on the low proposed by (Horton, 1945). Hortons's second low suggested that the length of a stream increases as the order of flow decreases. It means that the flow length is the maximum for the first order stream. The total length of Irai River is 2318.94 km., the sequential stream lengths are expressed in (table – 2). This explains the permeability of rock formation in the basin. The change may indicate flowing of streams from high altitude, lithological variation and moderately steep slopes (Singh 1997).

3. Mean Stream Length (Lsm) –

The stream length of various orders is calculated as a topographical map. Horton's Low of stream Length (Harton,1932) supports the theory that geometrical similarities are generally preserved in the basins of increasing order (strahier,1964). The average channel ^{Lu} length of order U is the ratio of the total length of the number of streams of the given order. The average length of the channel segments of a given order but shorter than the next higher order. The mean stream length is presented in (Table – 2).In the study area it is noted that Lsm varies from 0.71 to 79.7 km

4. Stream Length Ratio (R_l) –

Stream Length Ratio is defined as the ratio of the mean stream length of an order to the next lower order of stream segments. The ratio of the length of the stream between the different sequential streams of the study area does not follow any trend. This change can be attributed to the variability of slope and topography. Which Indicates the late youth stage of geomorphic development in the currents of the study area (Vittala, Govindiah,& Honne Gowda, 2004). The values of various order of stream length ratio presented in (Table – 2), The length ratio gives a general idea about the relative permeability of rock formation in basins.The stream length ratio of Irai river basin showed an increasing trend.R_l in Irai river basin range of 1.84 to 17.75

5. Bifurcation Ratio (R_b) –

Bifurcation ratio is the ratio of the number of streams of an order to the number streams of the next higher order (Horton, 1945, Strahler, 1964). Theoretically the bifurcation ratio is 2.0 and the natural drainage is 3.0 – 5.0 in systems. Which geological structures to not distort drainage patterns (Strahler, 1964). The Values of the bifurcation ratio are presented in (Table – 2). The average bifurcation ratio for Irai River Basin is 4.56 Which indicates moderate to high hilly region, moderate ground slope, runoff and moderate permeability of bed rock. This indicated that the drainage pattern of basin has not been affected by structural disturbance.

Table – 3 Result of Morphomatric Analysis.

Sr. No.	Parameter	Value
1	Basin Area $(km)^2$	1276
2	Perimeter (km)	194.66
3	Basin Order	6.00

4	Drainage Density (Ds)	1.82
5	Stream Frequency (Fs)	1.82
6	Texture Ratio (T)	6.50
7	Mean Bifurcation Ratio (Rb)	5.03
8	Form Factor (Rf)	0.26
9	Circulatory Ratio (Rc)	0.09
10	Elongation Ratio (Re)	0.58
11	Length of Overland Flow (Lg)	0.27
12	Constant Channel Maintenance (Cc)	0.55

6. Aral Morphometric Parameters

6.1 Drainage Area (A)-

Drainage area is defined as a collection area from which water would go to a stream or river. The boundary of the area is determined by the ridge separating water flowing in opposite directions, the area of the basin was computed by converting the merged geo-referenced and modified SOI Toposheets into a polygon on a 1 : 50,000 scale. The total area of the basin is found to be 1276 km^2.

6.2. Drainage Density (D) -

(Horton, 1932) Introduced Drainage Density. This is an expression to Indication the closeness of the channel distance, The significance of drainage density is recognized as a factor determining the time travel by water (schumm, 1956). The measurement of Drainage density is useful numerical measure of landscape dissection and runoff potential (chorley, 1969). Drainage density is known to vary with climate and vegetation, soil, rock properties, relief and landscape evolution processes (kelson and Wells, 1989; Oguchi, 1997; Moglen et. Al. 1998). Drainage density is generally divided into four categories i.e.,

Low<2, moderate 2-4, high 4-6, very high>6, Drainage density helps you to analyze the numerical measurement of landscape dissection and run – off potential (Ready Maji, & Gajlohiye, 2004). The Drainage density of the Irai Drainage basin is 1.82 which indicates moderate permeability and betters vegetation cover.

6.3. Drainage Frequency (Fs) –

Stream frequency (Fs) or channel frequency or drainage frequency for unit area can be defined as the total number of stream sections in a basin (Horton, 1945). The Drainage frequency of the entire basin is 1.83km^2, as show in table – 3, it indicate moderate permeability and moderate soil erosion.

6.4. Texturo Ratio (T) –

The meaning of drainage texture is relative spacing of drainage lines (Smith, 1950). The term drainage texture must be used to indicate relative spacing of streams in a unit area along liner direction. Drainage texture of any drainage basin depends on climate, rainfall, vegetation , soil and rock types, infiltration rate, relief and the stage of development (Horton, 1945; Smith, 1950). Texture is classified into four categories < 4 per km course, 4 – 10 per km intermediate, 10 – 15 per km fine and >15 per km ultra fine. In the Irai River basin drainage texture ratio is 6.50 which indicates intermediate and higher soil erosion.

6.5. Form Factor (F_f) –

According to Horton (1932) Form factor – Quantitative expression of drainage basin outline form through a form factor ratio which is the dimensionless ratio of basin area to the square of basin length, Basin shape may be indexed by simple dimensionless ratio of the basic measurements of area, parameters and length (Singh,1998). The form factor value of the basin is low, 0.26 which represents the elongated shape. The elongated basin with low form factor indicates that the basin will have a flatter peak of flow for longer duration, also lesser value shows elongated shape.

6.6. Circulatory Ratio (R_c) –

Circulatory ratio is the ratio of the basin area to the area of a circle with the same perimeter as the basin (Miller, 1953). The ratio is more influenced by

geologic structure, climate, relief, land cover and stream length and slope of the basin. It is a significant ratio, which indicates the dendritic stage at a basin, Its low, medium and high values are of the youth, mature and old stages of the life cycle of the tributary basins. Rc value of Irai river basin is 0.10.It is a significant ratio. Which indicates the dentritic stage of a basin?

6.7. Elongation Ratio (Re) –

Schumm (1956) defined elongation ratio as the ratio of diameter of a circle of the same area as the drainage basin and the maximum length of the basin, The higher rate of elongation ratio of a basin indicates active denudational process with high infiltration capacity and low runoff in the basin and lower indicates higher elevation and higher headward erosion with higher altitude and tectonic lines (Reddy et al., 2014; Yadav et al., 2014). The Values of the Elongation ratio usualy very from 0.6 to 1.0 in different climatic and geological types (Rudraiah, Govindaiahs, & Srinivas, 2008). Elongation Rate for Irai River basin is 0.58 which indicates the long – term low peak flow, the increased size of the basin.

6.8. Length of overland flow (La)

According to Norten (1945), length of overland flow is the length of water over the round before it gets concentrated into definite stream channels; It is one of the most important independent Variables that affect Hydrological and Physiographic development of the drainage basin. The length of the overland flow is approximately equal to half of the correlation of drainage density. This factor is inversely related to the average slope of the channel and is a quiet synonym with a large sheet flow length. In this study, the length of overland flow of the Irai river drainage basin is 0.27km which shows low surface runoff in the study area.

6.9. Constant Of Channel Maintenance (C)

The constant of channel maintenance is the inverse of drainage density (Schumm, 1956). In general, lowering the c values of the watershed indicate the permeability of the rocks and vice versa. The value C of Irai River basin is 0.55 it means that on an average 0.55sq. ft. surface is needed in basin for creation of one linear foot of the stream channel.

7.CONCLUSION

Drainage basin are frequently selected as a unit of morphometric analysis due to their topographical and hydrological integration. GIS software has been found to be of great use in the analysis of linear and Areal morphometric aspects of drainage basins, studies have shown that GIS based approach is more suited than traditional methods for evaluating drainage morphometric parameters at river basin level. The GIS based approach facilities the analysis of various moprhometric parameters and to find the relationship between drainage morphometry and properties of landforms, soils and eroded lands, The bifurcation ratio, the length ratio, and the stream order of the basin indicate that the basin is a six order basin with a homogeneous drainage pattern and no structural or tectonic control. Drainage density of Irai River Basin shows moderate permeability of rocks and in higher altitude area have high drainage density. Drainage frequency is indicate moderate permeability and moderate soil erosion, form factor with represent elongated shape. The complete morphometric analysis of drainage basin indicates that there is good groundwater potential in a given area.

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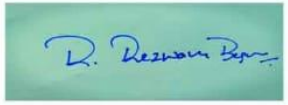

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