REVOLUTIONIZING SECTORS: HARNESSING CLOUD COMPUTING AND ARTIFICIAL INTELLIGENCE FOR ENHANCED SERVICES IN EDUCATION, DEFENSE, AND RESEARCH

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ABSTRACT

This study delves into the synergistic potential of integrating cloud computing and artificial intelligence (AI) to revolutionize services across education, defense, and research sectors. The evolution of technology has paved the way for innovative approaches to problem-solving and efficiency enhancement in these critical areas. In education, the amalgamation of AI technologies enables the development of personalized learning experiences. Through analyzing individual learning patterns, AI algorithms can tailor educational content to meet the specific needs of students, promoting a more effective and engaging learning process. Additionally, cloud-based platforms provide a flexible and accessible environment for storing and retrieving educational materials, facilitating remote learning, collaborative projects, and virtual labs. The defense sector stands to gain significantly from this integration, particularly in cybersecurity and predictive analytics. Cloud computing offers robust security features, and AI can analyze vast datasets to identify and respond to potential cyber threats in real time.

Furthermore, AI-driven predictive analytics can leverage historical data to anticipate security breaches or identify patterns in geopolitical events, enhancing the overall resilience of defense systems. In the field of research, cloud computing provides researchers with the computational power and storage capacity necessary for large-scale data analysis. AI algorithms play a crucial role in interpreting complex datasets, accelerating the pace of scientific discovery. Collaborative research benefits from cloud platforms, which serve as centralized spaces for data sharing, collaborative document editing, and real-time communication.

Additionally, cloud-based resources facilitate simulations and modeling, with AI optimizing these processes for improved accuracy and efficiency. The study emphasizes the cross-sector applications of these technologies, highlighting their role in resource optimization and scalability. AI algorithms contribute to efficient resource allocation, whether in terms of personnel, finances, or equipment, while cloud computing ensures seamless scalability based on demand.

However, implementing these technologies must consider ethical considerations, data privacy, and security concerns. Responsible deployment requires collaboration between public and private entities and substantial investments in workforce training to ensure that the full benefits of cloud computing and AI are realized while mitigating potential risks.



In conclusion, this study advocates for a holistic approach to leveraging the power of cloud computing and AI across education, defense, and research sectors. By addressing challenges, fostering collaboration, and prioritizing ethical considerations, these technologies can usher in a new era of enhanced services, efficiency, and innovation in these critical areas.

Keywords: Cloud computing, Artificial intelligence, Medical field, Whale optimized, Internet of Things

I. INTRODUCTION

World medical services are about to transform due to a fundamental change in digital technology from conventional medicine to intelligent medicine. Modern tools are used in intelligent medicine to make it simple to explore patient data, connect people with services and entities, and manage and respond to changes in the medical setting. Individuals, medical experts, associations, and authorities are just a few of the medical sector entities connected through intelligent treatment. Cloud computing (CC), artificial intelligence (AI), the Internet of Things (IoT), and sensor technology, all of which are developing rapidly, help to accomplish this. These innovations significantly influenced the evolution of the rapidly developing, groundbreaking idea termed bright treatment [1]. Health systems are evolving and becoming more contemporary owing to the development of IoT and CC technologies, and prominent companies are increasingly embracing cloud technology in professional medical care. The United States created a cooperative care system to make it simple for patients to obtain scattered medical data. The US Secretary of State is partnering with all Scripts and MicroHealth to develop a cloud-based healthcare system to administer its worldwide digital health data. Due to this technology, the Ministry of State's medical and administrative personnel will have simple availability to the individuals' hospital history. Both patients and healthcare providers will gain from this. The use of IoT gadgets in the medical sector is expanding. The IoT and CC innovations are being incorporated into healthcare solutions by medical professionals in Europe and Asia [2].

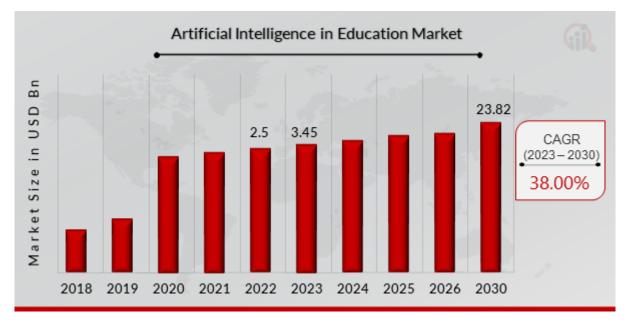
Moving more people to cities makes the concept of a digital society seem old-fashioned. Transforming healthcare to be more efficient, cheaper, and patient-centered is the cornerstone of a digital town. A complete understanding of the different digital city systems is required before CC and AI can be used to build RH monitoring platforms. These platforms take the shape of supporting techniques, apparatus, platforms, concepts, layouts, application cases, and software products. The fundamental way that the CC-based RH platform uses AI is to collect various records and information.

On the other hand, various medical sector delivery models and medical outcome assistance tools contain AI techniques widely utilized to develop analytical depictions. Medical outcome support tools thoroughly consider each element before recommending a specific course of therapy, lifestyle recommendations, and care plan to individuals. The software supports healthcare activities and analyzes bodily functions such as blood sugar, respiratory rate, and pulse rate [3]. All medical equipment used in the medical sector has been automated due to improvements in modern technology. These technological innovations make life easier and more pleasant. People thus employ a variety of gadgets in their everyday lives, such as wearable sensors. A novel way to gather medical data for effective health monitoring is made possible by wearable sensors and virtual communities. However, utilizing wearable sensors to continuously monitor patients produces a lot of



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medical data. These tools may be used to monitor the person closely in real-time. It helps to monitor the patients and detect the disease. Early disease detection is essential to treating patients [4]. Remote healthcare observation is a kind of telehealth that utilizes digital health technology to gather and transmit patient wellness information to their medical team. RH may be used to collect and show longitudinal patient-generated medical information for preventive therapeutic practice and to include the patients' families in children's treatment. For many years, gathering remote information has been regarded as the treatment pattern for various severe illnesses. However, the widespread use of RH in medicine has been restricted by software restrictions, shortages in connectivity to the Web and technological equipment, a lack of technical education, inadequate payment, and other issues [5]. Hence, we presented a novel technology cloud computing and artificial intelligence (CC-AI) based technique for detecting disease in remote monitoring and improving healthcare services.



An efficient method for detecting breast cancer may be available, according to researchers [6], if a detection model based on risk characteristics could be developed. Machine learning (ML) methods have been used to enhance the efficacy of early detection. In order to detect breast cancer sooner based on risk factors, they proposed employing support vector machines (SVM) in conjunction with extra trees, a heavily randomized tree classification. The breast cancer grade was determined using support vector machines (SVM), and extra-trees classification was used to remove extraneous data. Developing computer-aided detection (CAD) in [7] aimed to differentiate between normal functioning and AD. Most of the earlier methods used image processing techniques for preprocessing and feature retrieval, and then they developed a system or classification to group the brain pictures into different categories.

Consequently, the retrieved attributes substantially affected the identification rate of previous methods. This issue is addressed by creating a state-of-the-art CAD system that utilizes a convolutional neural network (CNN) to differentiate between individuals with normal cognitive function and those with Alzheimer's (AD). The CNN's slow-level prediction results from its many layers and prediction nodes. Researchers [8] focus on



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enhancing survivorship estimation for individuals with osteosarcoma. The Kaplan-Meier assessment is a popular statistical method utilized for this aim. The improvement of patient experience and economic management now depends on life prediction. They offer an alternate survivorship evaluation that uses genetic algorithms and K-nearest neighbor (KNN). To maintain all of the trained information, KNN needs much storage. Researchers [9] created a method that uses a tumor segmentation technique to remove problematic tumor tissue. Then, characteristics based on surface and structures are used to describe breast lesions. Initial and second-order data are included in the retrieved characteristics. Utilizing compound feature vectors, a combination of MI techniques is used to identify breast cancer. Different ML methods cannot appropriately manage the enormous amount of multi-feature information on diabetic illness. Focusing on deep ML and information-fusing viewpoints, an intelligent healthcare classification method for a diabetic condition is developed. They can reduce the needless strain on system processing power by using data fusion. The aggregate ML system is then taught to detect diabetes [10]. Using wristband photoplethysmography (PPG) data and fundamental biological indicators, a non-invasive diabetes mellitus recognition method is developed to make diagnosing the condition simple. One strategy to reduce the quantity of data needed for feature selection is to use a hybrid feature selection method, often known as Hybrid FS [11]. A hybrid decision support system, as proposed by the researcher [12], might aid in the early detection of heart illness when combined with the patient's clinical features. The researchers used the multivariate restoration by chained formulas method to deal with the missing data. A hybrid feature selection strategy, integrating the Genetic Algorithm (GA) with recurrent attribute elimination, was used to choose suitable features from the given database. Among the many problems with these current methods are their long detection times, high error rates, sensitivity to massive datasets, high computing energy requirements, and poor detection accuracy.





The advent of cloud computing is a watershed moment in technological advancement. Every company has had an on-site data centre since the beginning of the computer age. They are self-sufficient in computing power, data storage, and network infrastructure. On top of these systems, a typical example of corporate computing, they would run any application. The term "cloud computing" refers to a model in which users have access to shared, virtualized computer resources over the Internet on an as-needed basis. When it comes to innovation and progress in technology, the possibilities of cloud computing are limitless.

Government efforts in India to improve the country's economy, society, and schools may benefit from cloud computing. In addition, cloud computing can lay the groundwork for a new revolutionary sector that may employ the nation's rising young via telemedicine, online courses, online jobs, and a commerce-based business.

Cloud computing's meteoric rise has swept the globe. Scalability, agility, data centralization, high performance, security, and cost/time efficiency are all benefits of cloud computing. However, there is no need for a solid framework to oversee the rules and processes put in place to make the most of cloud computing resources. IT cannot provide adequate governance and compliance monitoring due to the cloud-based system's lack of access to all operational infrastructure. It is essential to adopt significant alterations in the IT governance approach to give the finest cloud computing system with minimum obstacles and uncertainties.

Cloud computing services have evolved from platforms like Google App Engine and Azure to infrastructure, which include providing computers and storage space. Cloud providers go above and beyond by providing data platform services that connect all accessible databases. This progression of developments shows the expansion of AI and cloud computing.

Conversely, AI, or artificial intelligence, describes the ability of robots to mimic human intellect. This is the final product of giving computers human-level intelligence, which includes reasoning, learning from experience, finding meaning, and generalizing.

The core belief is that artificial intelligence (AI) can be precisely described in terms that machines can replicate. Hence, these robots are designed to "think" similarly to humans and imitate human responses to certain situations.

Cloud computing and artificial intelligence work hand in hand in many ways, and AI might be the gamechanger when it comes to cloud computing. Offering artificial intelligence as a service enhances current cloud computing technologies and creates new avenues for growth.

The leading cloud computing organizations believe the IT sector will undergo a sea shift when cloud computing services are combined with AI technology. The correct kind of customers will keep flocking to public cloud companies' AI development efforts. The technology may be in its infancy, but it will inevitably evolve, and we should anticipate great strides in the future.

II. LITERATURE REVIEW

In cloud computing, users do not own the networks, storage, servers, services, or apps; instead, they access them over the Internet and pay for their use. Distributed database management systems (DBMS) in the cloud



provide computing on demand. It uses a shared network to access and share data, programs, and other webbased services. Databases stored in the cloud may be accessed and processed from any place with an internet connection. I have covered cloud computing and its applications in this article. Different advantages and disadvantages of cloud computing may be addressed in the future, such as how to use cloud computing to enhance performance.

With its many useful features—including widespread distribution, complete interactivity, real-time dynamic, and so on—web-based network management that centers on databases proposes a practical mode for processing network information. This model helps with timely performance adjustments and fault recovery. An essential function for this aim is the cloud-based database management system. An umbrella word for a relatively new kind of Internet-based network computing, "cloud computing" describes this emerging trend. After implementing utility computing, the next logical step is cloud computing. A platform is a set of interconnected hardware, software, and Internet infrastructure that deliver these components to end users over the Internet. The advantage of these platforms is that they provide a simple API or graphical user interface, which allows users and applications to avoid dealing with the underlying infrastructure's complexity and complexities. Databases stored in the cloud may be accessed and processed from any place with an internet connection. When scaling up, most web applications rely on a distributed storage solution.

When it can become a real, valuable, and economically viable part of cyberinfrastructure, information technology (IT) stands out and thrives. When an application or program is hosted on a networked server or servers instead of on a local computing device like a PC, tablet, or smartphone, cloud computing is known as cloud computing. "cloud computing" refers to delivering on-demand access to shared computer resources and services over a network of remote servers.

The configuration computing pool is shared. Services are made available to consumers using cloud computing on demand. There is no entry barrier for consumers or apps when it comes to accessing the cloud since, in essence, clouds are transparent. Retrieving data from the server is similar to the classic client-server paradigm of network architecture. Cloud computing differs primarily in that it uses virtualization to execute in parallel, allowing it to provide data to several users simultaneously. Through well-defined protocols, resource quotas (such as CPU and memory share), and software configuration (such as operating systems and offered services), virtualization allows for the dynamic availability of an execution environment to authorized clients. With the advent of "granular" computing resources, end users and operators may enjoy perks, including on-demand self-service, widespread access from many devices, pooling of resources, quick flexibility, and the ability to measure service based on consumption.

The strategy behind the technology:

Executives and IT workers must work together to develop a unified cloud strategy that produces desirable results for the company. Just as IT cannot operate independently within the company, cloud computing cannot operate independently inside IT.

You will need to modify your IT infrastructure to accommodate the proprietary technology of other cloud providers. If you plan for the future, you need an infrastructure flexible enough to adjust to your evolving



business and IT needs. Business and cultural expectations are central to Dell's open cloud strategy design and implementation process.

1. **Cloud computing is not a technology; it is a strategy.** Cloud computing is an overall strategy to accelerate growth, empower your workforce, and transform your business. We are committed to developing solutions that match your business vision and drive it forward with maximum flexibility and minimum risk.

2. **Cloud computing should adapt to you, not you to it.** Most businesses are already on the cloud journey, but each has unique needs and obstacles. We work with you and your staff to match your strategy to the right cloud solutions without disrupting your business.

3. **Cloud computing works best when it integrates seamlessly.** Our approach is not to rip and replace but to use existing investments and build from the current state. Cloud computing is a logical progression to what organizations are doing and a way for businesses to build on existing technologies and processes.

Key features of Cloud Computing:

- On-demand self-service Users can manage computer resources independently of service providers via on-demand self-service.
- Pervasive network access access is enhanced by using various technological devices.
- Resource pooling that is not reliant on physical location—all of the provider's customers share the same pool of computer resources, which are allocated differently based on user demand.
- Rapid elasticity The end customer may buy any quantity of the available capabilities at any moment because of the rapid flexibility.
- Pay as you go one model involves tracking how much data storage, bandwidth, and processing power each user uses monthly and billing them accordingly.

Over the last 20 years, AI research has substantially enhanced the efficiency of both production and service systems. A paper that provides a comprehensive literature review of AI-related theoretical frameworks and practical experiences is urgently needed. Integrating, condensing, and elegantly distilling state-of-the-art artificial intelligence to demonstrate the experiences in the area is the goal of this article. This article focuses on the latest AI advancements and applications, offering a comprehensive overview of the area. Newcomers to the area of artificial intelligence are the intended audience for this publication. Additionally, it brings to the attention of seasoned researchers some issues they are already familiar with.

Engineering, science, education, health, business, accounting, finance, marketing, economics, the stock market, and law are just a few of the many areas that have made artificial intelligence (AI) a prominent focus of research in the 21st century. It is becoming more challenging to keep up with the proliferation of research in artificial intelligence due to its vast growth. Aside from the uses of AI, research has been fragmented into several subfields, each of which has emerged as its own body of knowledge.



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III. THE CHALLENGE OF THE AI FIELD

In light of the exponential growth of information technology throughout the globe, which has defined the evolution of both for-profit and non-profit organizations, this body of work emerged in response to the difficulties posed by AI.

There are two main drivers of the need for AI research:

(i) to help newcomers to the area of artificial intelligence grasp the framework of the AI literature. (ii) The widespread fascination with AI brought about a dramatic rise in funding for AI research and development facilities.

Everyone from budding scientists to historians is interested in keeping up with the latest findings in their respective fields and passing on what they have learned. Knowledge sharing in AI allows for developing new methodologies and ideas, leading to a deeper understanding of the area. In light of these goals, this article has also been written to provide AI researchers with the information they need to sustain their pursuit of expanding this field of study by generating novel concepts. This would allow them to advance state of the art in artificial intelligence.

The next portion of this article provides a high-level overview of some significant AI research topics. This is to familiarise the audience with AI's vast array of subjects. An extensive literature evaluation organized by the main AI categories is provided in another section. If you want to research artificial intelligence, read this review since it poses some significant issues. If these concerns are adequately addressed, they will put to rest several problems, both technological and otherwise, that have persisted over the last decade.

An overview of the AI field

On a high level, we may group the many applications of AI into sixteen distinct domains [13]. Some examples of these fields include the theory of computation, reasoning, programming, artificial life, belief revision, data mining, distributed AI, expert systems, genetic algorithms, systems, knowledge representation, machine learning, neural networks, theory of theorems, and natural language understanding [14].

Reasoning is the first central aspect that is taken into account here. From case-based, non-monotonic, model, qualitative, automated, spatial, temporal, and standard sense standpoints, reasoning research has progressed along several paths.

Genetic Algorithms (GA) is the second main field of artificial intelligence discussed here. This search algorithm determines potential results using natural selection and genetics principles. It iteratively maintains a population of structures as a possible solution to specific domain problems. Each generation uses specialized genetic operators, including reproduction, cross-over, and mutation, to create a new population of candidate structures based on assessments of the current population's structures for how well they solve problems.

Expert systems make up the third facet of AI that has been covered so far. When given a particular set of issues, an expert system can do it with the same precision and knowledge as a human expert. Another way of looking at it is as a computer system that can do tasks that generally would need a human expert.



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The term "natural language generation" (NLG) refers to software systems that can use non-linguistic data to generate documents in human languages like English and others. Like other AI systems, NLG systems need large quantities of elusive information. The fact that humans had such a wide range of writing styles only exacerbated the already substantial challenges posed by the tasks the systems sought to do, which were complicated, innovative, and little understood [15].

Knowledge representation (KR)

Modeling application domains and making stored information easily accessible are two critical uses for knowledge bases. The primary focus of KR research was formalisms that are expressive, robust reasoning services suited to handle a tiny knowledge base.

Theoretically and practically, AI thinking has a wealth of literature supporting it [16]. Scientists have conducted their duties by:

- Establishing axioms that provide a thorough and solid axiomatization of reasoning logic;
- Theoretical features of algorithms used in qualitative temporal reasoning;
- Relevant information for a specific reasoning issue (independence); and
- Qualitative reasoning techniques. Aromatizing causal thinking was the subject of research published in [17].

For three progressively more broad types of causal models, axiomatizations are given.

- Theories that are recursive but do not accept feedback;
- Theories that have unique solutions to their equations;
- Theories that are arbitrary but may or may not have unique solutions to their equations. Evidence suggests that expanding the language of Galles and Pearl is necessary for reasoning about causation in the broadest third class. Furthermore, the complexity of the decision-making methods is described for each language and class of models taken into account

The complexity of reasoning, reasoning about minimal belief, axiomatizing, sampling algorithms, conditional plausibility, efficient methods, logic and consistency, fuzzy description logics, backbone fragility, diagnosis, independence, domain filtering, and fusion are some of the general areas in which the concept of reasoning in Artificial Intelligence has been discussed. Complex reasoning literature focuses on expressive description logic and spatial congruence. The satisfiability problem in the spatial algebra MC-4 is NP-complete, and Cristani [18] presents a new algebra for reasoning about spatial congruence. He also categorizes tractability in the algebra-based on identifying three maximal tractable subclasses, one containing the fundamental relations.

There are several facets to the natural language literature as a whole. Research on the semantics, mapping, knowledge acquisition, and selection process of natural languages has been conducted within the scope of this article. The first two items find taxonomy-based representations of natural languages and grouping semantic relationships. Knowledge acquisition and selection have been addressed from the perspective of the tasks' inherent characteristics and the problem's informativeness.



An ever-expanding section of the AI literature, genetic algorithms have yielded a plethora of research discoveries. Turney [19] is an excellent illustration of this kind of study. A novel method for cost sensitivity categorization, ICET, is presented in the paper. ICET's decision tree induction technique evolves a population of biases via a genetic process. In this comparison, ICET is pitted against C4.5, an algorithm that does not consider cost, and three other algorithms for cost-sensitive classification: EG2, CS-ID3, and IDX-.

The multi-faceted field of knowledge representation is essential in the study of artificial intelligence (2003). Here is a representative sample of research on knowledge representation. Researchers looked at how efficient the prepositional knowledge representation (PKR) formalism was in terms of space use in their research [20]. Prepositional formulations (theorems) or sets of prepositional interpretations (models) are considered to be the two primary forms of knowledge. A formal method was given for discussing how well different PKR formalisms compactly express specific models or theorems. Not all formalisms with the same time complexity fall into the same class of space efficiency, which is an intriguing finding.

There is much material in the field of machine learning [21]. Each of the machine learning papers is summarised below. Schlimmer and Hermens [22] detail a two-featured interactive note-taking system for pen-based computers. This system exemplifies the role of a software agent that is a learning apprentice. A machine learning component analyzes the data provided by the user to determine its grammar and semantics.

The work was also helpful for the machine learning literature because of Lerman et al. [23]. This research takes a machine learning-based solution to the Wrapper maintenance challenge. The authors provide a robust algorithm to learn data structures from positive instances alone. When a wrapper fails to extract accurate data, often due to a format change at the Web source, the Wrapper verification mechanism will flag it. After successfully re-inducing the wrappers, they achieved recall and accuracy scores of 0.80 and 0.90 on the data extraction task.

Halpern [24] discusses and examines the assumptions required to establish Cox's theorem in fascinating research. Although the above assumptions are relatively strong and not natural, they allow one to prove a theorem

like Cox.

The article by Ginsberg examined issues that arise during the development of a program to play contract bridge [25]. The described program, GIB, incorporates five distinct technological advancements: partition search, practical application of Monte Carlo techniques to real-world problems, implementation of alphabeta pruning from total orders to arbitrary distributive lattices, focus on achievable sets to address inherent problems in the Monte Carlo approach, and use of squeaky wheel optimization to find approximative optimal solutions to card-play problems. Another article introduced an algorithm to detect adjectival anaphors and noun-phrase antecedents of pronouns in Spanish conversations. The algorithm uses an anaphoric accessibility space to locate the noun phrase, dependent on linguistic preferences and limitations. Prologue is used to implement the algorithm. With an accuracy of 81.3% for pronominal anaphora resolution and 81.5% for adjectival anaphora, this investigation found that 95.9% of antecedents were placed in the intended space.



Programming has been the subject of several papers in artificial intelligence. Most articles have been written for mathematical frameworks or modeling, which makes sense given that programming is based on empirical evidence. Written by Sato and Kameya [26] is an example of an article on this subject. Learning logic program parameters for symbolic statistical modeling is the key to this project's success. The authors defined clause programs with parameterized distributions of probabilistic facts. Probability distribution, potential world semantics, and the classic least-her-brand model semantics in logic programming are all covered in this study. It can apply to any arbitrary logic program, including HMMs, PCFGs, and Bayesian networks.

The population ensemble techniques were empirically studied on neural networks by Opitz and Machin [27]. When it comes time to categorize new examples, an ensemble of separately trained classifiers (such as decision trees or neural networks) combines their predictions. According to earlier studies, ensembles of classifiers are often more accurate than the sum of their parts. The results show that boosting may produce ensembles that are not as accurate as individual classifiers, and bagging is not always more accurate than boosting. Additional results demonstrate that boosting ensembles often overfit noisy data sets, diminishing their performance.

IV. INTEGRATION OF CLOUD COMPUTING WITH ARTIFICIAL INTELLIGENCE

Shortly, businesses can use cloud computing (CC) and artificial intelligence (AI) as innovative transformation technologies. This will allow them to become more competent and provide their services to customers intelligently, which means quickly, efficiently, and economically. This paper looks at how top education, defense, and research institutions in developed and developing nations use CC and AI. Better goods, more customer-satisfying services, and increased operational efficiency are the outcomes of innovative companies using the twin technologies of cloud computing and artificial intelligence. The following reasoning concludes that AI and cloud computing provide cutting-edge commercial potential. Consequently, for improved use in education, defense, and research, it is believed that ICT should be technologically dynamic and updated.

V. CONCLUSION

Innovations in cloud computing, artificial intelligence, and wearable technology have all helped the healthcare sector. If we are serious about helping people with illnesses live better lives, we must invest in these ground-breaking innovations. Patients may have more extended life periods and better treatment outcomes if diseases are detected early. These CC-AI technologies make remote health monitoring available to the general public to diagnose and cure illnesses. The whale-optimised fuzzy neural network (WO-FNN) is a CC-AI-based technique we proposed for successful detection. This study employs a dataset derived from sensors worn by individuals. The data is preprocessed using statistical normalization. Several performance metrics are assessed, such as precision (95%), responsiveness (98%), specificity (95%), and calculation time (65s). The compared methods are EKF-SVM, Bagging Ensemble with K-Nearest Neighbour, Deep-learning Diabetic Retinopathy (DeepDR), and Convolutional Neural Network (CNN). The findings demonstrate the efficacy of the proposed method for distant illness detection—possible new features for enhanced detection speed in further iterations of the proposed system.



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