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Applying Machine Learning Frameworks to Analyze Large Amounts of Data from IOT Networks in Order to Improve the Efficiency of Cloud Computing Applications: A Review

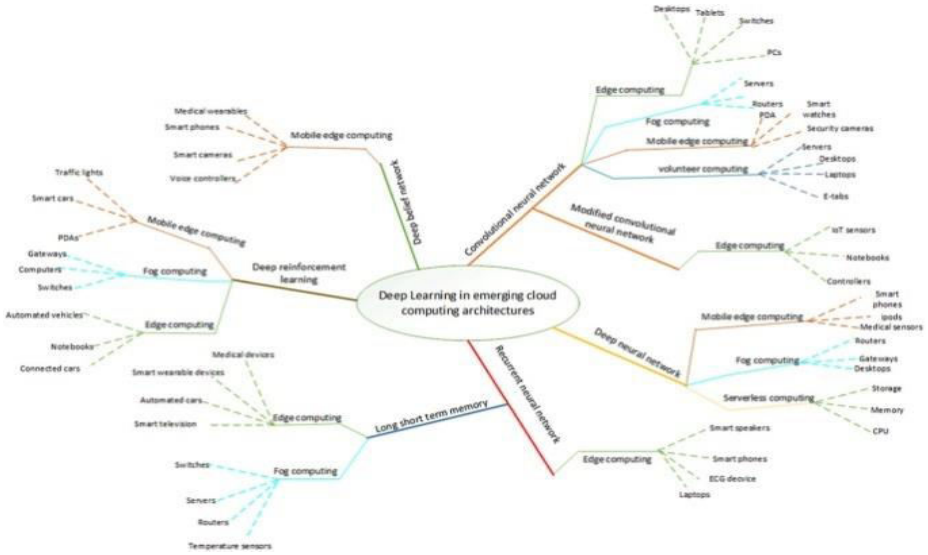
Shivam Tiwari, Abhishek Vishwakarma

Assistant Professor, Dept. of C.S., Baderia Global Institute of Engineering and Management Jabalpur, India

Assistant Professor, Dept. of C.S., Baderia Global Institute of Engineering and Management Jabalpur, India

ABSTRACT: Next-generation cloud computing designs emerged as a response to shortcomings of trend cloud computing concepts. Shallow intelligent algorithms are unable to handle the massive volumes of data produced by the developing cloud computing infrastructures. Researchers have lately begun to pay close attention to "deep learning algorithms" because of their capacity to handle large-scale datasets and use them to address issues in newly developed cloud computing systems. On the other hand, there is currently no thorough literature study available on the application of "deep learning architectures in cloud computing" system development to address challenging issues. We carried out a broad writing review on the uses of "deep learning" architectures in cutting-edge "cloud computing" systems in order to close this gap. There are ramifications for data generation with the new "cloud computing" systems. The massive amounts of data produced by the new paradigms are known as "big data." There's a chance that the data generated won't get the chance to be examined to find out fresh information.

KEYWORDS: Next-generation cloud computing, Deep learning algorithms, Cloud computing systems, Big data, Data generation.



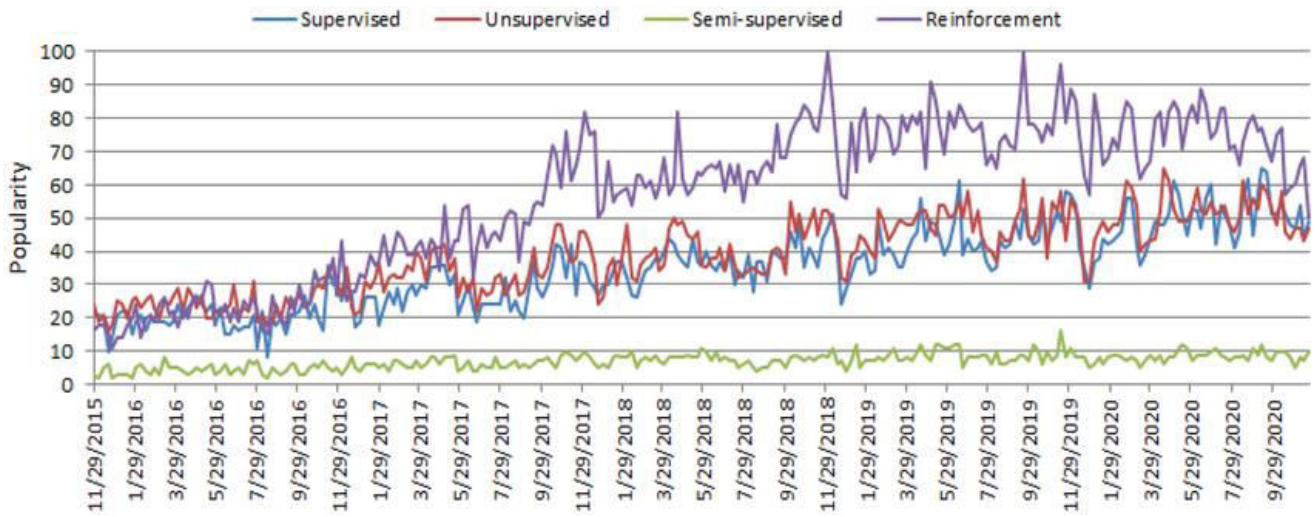
I.INTRODUCTION

The most potential computing paradigm to introduce the idea of "computing utilities" to the market is "cloud computing". Similar to the pay-per-use models for gas, electricity, water, and telecommunications services, IAAS, PAAS, and SAAS are provided as "computing utilities" under the cloud computing standard via shared delivery networks. Cloud computing has given rise to various integrated computing and networking paradigms, including

industry 4.0, edge, fog, mist, IoT, Software-Defined Networking (SDN), and digital twin. In order to get together the demands of next-generation computing, work with the addition of many "cloud computing" paradigms and their archetype is trending.[1] In this era of data, where the whole thing is digitally recorded and connected to a data resource, we are living in the age of data [21, 103]. In the recent digital world, Various types of data, such as those stemming from the "Internet of Things (IoT)," cyber security measures, urban infrastructure, commercial enterprises, mobile devices, online networking platforms, healthcare systems, the COVID-19 pandemic, and numerous other origins, are readily accessible examples.[1] The data is expanding daily and can be classified as unstructured, semi-structured, or structured; these topics are briefly covered in sect. "Types of Machine Learning Techniques and Real-World Data." By sketch conclusion from these data, many intellectual applications in the related fields can be constructed. For example, the pertinent cyber security facts can be used to make an automated and intelligent cyber security system that is data-driven.

Deep learning, a subset of machine learning, relies heavily on artificial neural networks as its cornerstone. These networks possess the capacity to discern complex connections and patterns within datasets.[2] We're not required to explicitly code every aspect in deep learning. Because of the availability of enormous datasets and the advancements in computing power, it has grown in popularity in recent years.Due to the fact that deep neural networks, or artificial neural networks (ANNs), are its foundation (DNNs). These neural networks, designed to glean insights from extensive datasets, mimic the structure and functionality of real neurons found in the human brain.[2,3]
The machine learning subfield of "deep learning" models and solves complex problems using neural networks.

Fig. 1From: Algorithms, Practical Uses, and Future Directions for Research in Machine Learning



II. LITERATURE REVIEW

1. According to Jauro et al. (November 2020), " Architectures for deep learning in developing cloud computing systems: current advancements, obstacles, and future study directions" explores the most recent developments in deep learning structures inside rapidly developing cloud computing frameworks. It looks at the difficulties of incorporating deep learning into cloud environments and outlines some directions for further investigation.
2. A thorough analysis and taxonomy of machine learning approaches within various integrated cloud computing paradigms are presented in "Exploring machine learning scheme within rising cloud computing included paradigms: A comprehensive survey and taxonomy" (Dinesh Soni and Neetesh Kumar, September 2022). The survey classifies different strategies and talks about their benefits, drawbacks, and possible uses.
3. Published on March 22, 2021, the review article "Machine Learning: Algorithms, Real-World Applications, and Future Research Directions offers insights into the field of machine learning algorithms", their real-world applications, and the direction of continuing research. It provides a comprehensive overview of machine learning's current condition and highlights its importance in a variety of fields.

4. The use of "deep learning techniques in cloud computing environments is the special focus of Deep learning for optimizing cloud computing": An extensive review" by M.A. Abdelwahab et al. (June 2019). The paper discusses the benefits, challenges, and potential uses of deep learning to improve cloud infrastructure and services.
5. The January 2018 paper "Deep learning for comprehensive big data analytics: A thorough review" by J.L. Zhang et al. provides insightful information about using deep learning for large-scale big data analysis. While not specifically focused on cloud computing, the material in this paper is relevant to handling large amounts of data in cloud systems. It investigates various deep learning models, techniques, and uses for them while examining big datasets.

III. CONCLUSION AND FUTURE WORK

This paper has shed light on the critical role that deep learning algorithms play in enhancing the effectiveness of cloud computing applications, especially when it comes to the analysis of large datasets that are derived from Internet of Things networks. Traditional cloud computing techniques have had difficulty with the large amounts of data generated by changing infrastructures. But the development of deep learning offers a possible way to address these problems. Cloud computing can efficiently procedure and examine massive amounts of data by means of deep learning frameworks. This can lead to the discovery of important insights and an improvement in overall performance.

The review of the literature has highlighted current developments in deep learning architectures for cloud computing frameworks as well as the difficulties in integrating them. Even while using deep learning for cloud computing is becoming more popular.
There are a lot of directions this area can take future research-wise. First and foremost, more research is required to create solid frameworks for integrating deep learning architectures into cloud computing systems. To ensure efficient deployment in real-world circumstances, this entails addressing issues with scalability, resource management, and interoperability.

Second, in order to evaluate the efficacy and performance of deep learning-based methods for optimizing cloud computing applications, empirical research is crucial. A thorough understanding of the benefits and drawbacks of implementing deep learning in cloud systems can be gained by benchmarking against conventional techniques and conducting comparative analyses using real-world datasets.

In addition, further research should focus on investigating novel uses of cloud computing using deep learning that go beyond data analysis. This could include things like resource

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