# *Review of the Fog Computing Analysis Conducted Using the Internet of Things*

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**Abstract**

*Cloud machine designs have numerous restrictions due to the improved autonomy and distributed IoT setup. The Internet of Things is approaching cloud infrastructure. The fog manages and stores IoT data on IoT devices rather than on the cloud. The fog, as opposed to the cloud, provides faster reflexes and higher performance. As a result, fog computing may be the optimal IoT solution for supplying powerful and effective resources to a large number of IoT users. This paper seeks to analyse the advantages and disadvantages of fog computing's cutting-edge technology and alignment with the IoT. This study will also look at cloud and fog technology, as well as how to employ cloud and fog paradigms to improve current IoT technologies. Finally, outstanding issues and new research directions in fog estimation and IoT are mentioned.*

***Keywords:*** *- Fog Computing, Internet of Things (IoT), Big data, Analyses, Cloud computing*

## INTRODUCTION

Fog processing, also known as fog networking, moves the limitations of software, data, and compute from the central cloud to the network's logical service stream. The fog networking approach is used to build a network (Anawar et al., 2018; Sharma & Trivedi, 2014; Delfin et al., 2019; Ahmed & Zeebaree, 2021). Instead of critical network access gateways and those found in LTE switches, management,


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configuration, and power are provided via the Internet Backbone (Mouradian et al., 2018). The fog computing system may be described as a highly virtualized computing architecture that provides hierarchical computing resources to nodes via the edge processor. Large frameworks and apps coordinate this fog node. facilities for processing and delivering material in close proximity to end users (Saleem et al., 2020; Ahmed & Yasin, 2012; Bargarai et al., 2020). The Internet of Things (IoT) is a massive collection of artefacts that connect via a network or the Internet. These items are a combination of electronics, cameras, and apps for tracking various aspects of the object's operation. Each entity generates and collects information from its surroundings via sensors, which it then transmits over a channel to other artefacts or a central database (Sadeeq & Zeebaree, 2018; He et al., 2020; Aburukba et al., 2018). One of the biggest issues of the IoT and a major difficulty for all IoT technology firms is the preservation and transformation of this created data (Abdulazeez et al., 2020; He et al., 2020; Husain et al., 2021).

Analytics in the Fog The collection and transfer to the cloud of all data created by IoT devices and sensors creates significant issues for Internet infrastructure and is sometimes prohibitively expensive, realistically impractical, and frequently useless (Mehdipour et al., 2019; Rashid et al., 2019; Ali et al., 2020). When large amounts of historical data are sent to the cloud with minimal latency, the analytics function well, but not for real-time apps. The introduction of IoT looks to simplify things by speeding up real-time high-speed deployments, moving analytics to the network, and increasing real-time analysis (Taneja & Davy, 2016; Khalid & Askar, 2021). Approaching fog computing allows data to be held until it enters the cloud, reducing the time and cost of transmission and eliminating the need for bulk data storage. It is often the best technique for cellphones and utilities (Aburukba et al., 2018; Etemadi et al., 2020).

This article conducts a comprehensive examination of the latest and most effective approaches to decision trees developed by researchers over the last three years in many fields of machine learning. The specifics of each technique, such as the use of algorithms or approaches, databases, and the results achieved, are also described. Furthermore, we detailed the most commonly used strategies as well as the most precise procedures reached. The remaining paper is organised as follows: Section 2

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discusses the analysis of fog computing for the Internet of Things algorithm, including its types, benefits, and drawbacks; Section 3 provides a related work on the analysis of fog computing for the Internet of Things algorithm; Section 4 compares and discusses the analysis of fog computing for the Internet of Things; and Section 5 concludes the research work.

## 2 Background Theory Fog Computing (FC).

CISCO coined the phrase "extension of the cloud computing concept from the heart to the end of the network" in 2012. Calculation near the network's edge, closer to IoT and/or end-user devices, is likely. It also makes virtualization easier. However, in the context of MEC and cloudlets, fog is directly related to cloud life. The relationship between fog and cloud has received specific attention (Baucas & Spachos, 2020; Aljumah & Ahanger, 2018).

Mohammed and Zeebaree, 2021; Aljumah and Ahanger, 2018). The addition of computing fog to the edge of the traditional cloud computing network model enables the development of complex and enhanced goods or applications. Calculation, retrieval, and networking services between IoT and traditional cloud end nodes are provided by substantially customised computing units (Aazam & Huh, 2014; Aazam et al., 2018; Kaur et al., 2020).

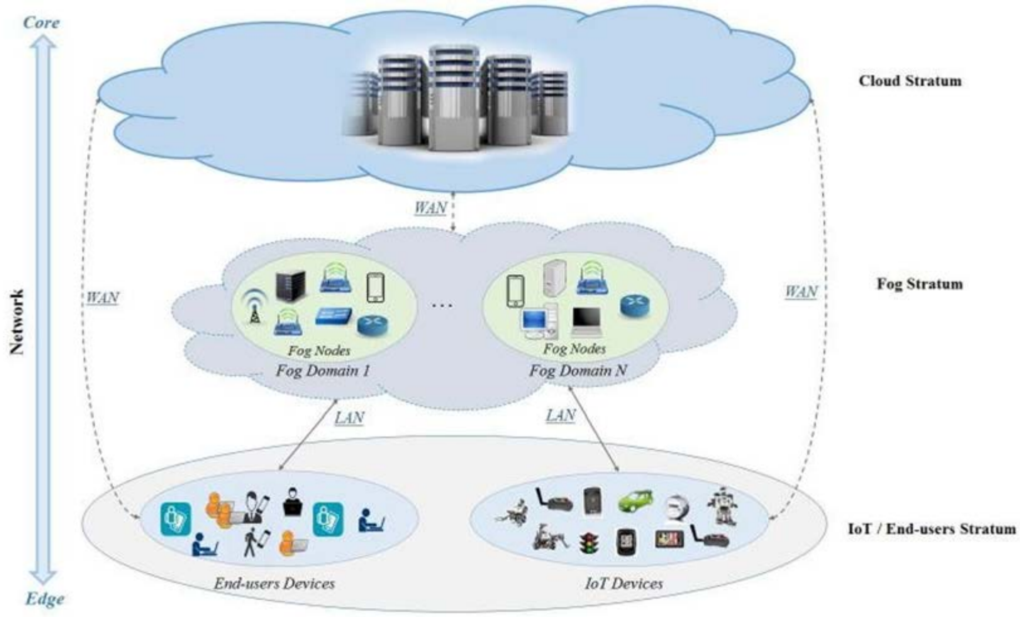


*Figure 1: The Fog System (Aljumah & Ahanger, 2018)*


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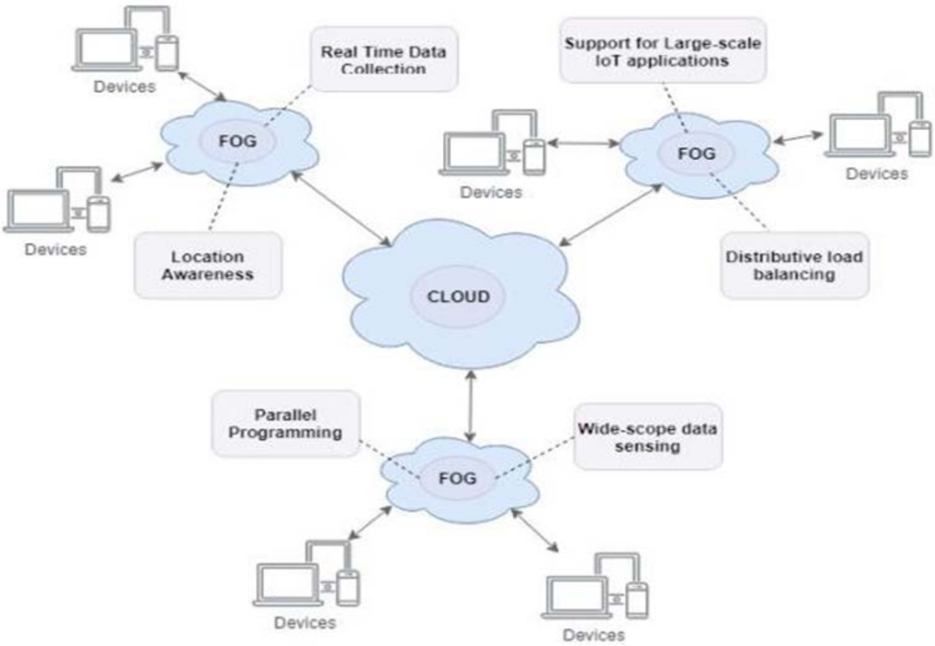


*Figure 2: Fog-based IoT network (Baucas & Spachos, 2020)*

**Internet of Thing (IOT)**

When the Internet itself arises, the Internet of Things (IoT) will be the next big thing. Millions, if not billions, of 'intelligent" computers are projected to be connected together and share knowledge and data over the internet.

IoT supporters see it in practically every aspect of our lives (Aazam & Huh, 2014 ; Atitallah et al., 2020). to stay safe from these sophisticated gadgets. The sensors are standard versions of such a smart system. IoT, the technological being, is a revolution that reflects the future of communication and connectivity. In the Internet of Things, "stuff" refers to everything on earth, whether it is a communication system or a foolish non-communicating person (Pop et al., 2020).

From a sophisticated computer to a leaf of a tree or a Coke bottle, the things become Internet contact nodes, means of data exchange, typically via radio, and frequency tags for recognition. IoT and things are also considered smart. Smart objects are artefacts for the environment and people that are not only physical, but also interactive, organised, and execute duties (Baucas & Spachos, 2020; Zhang et al., 2020).


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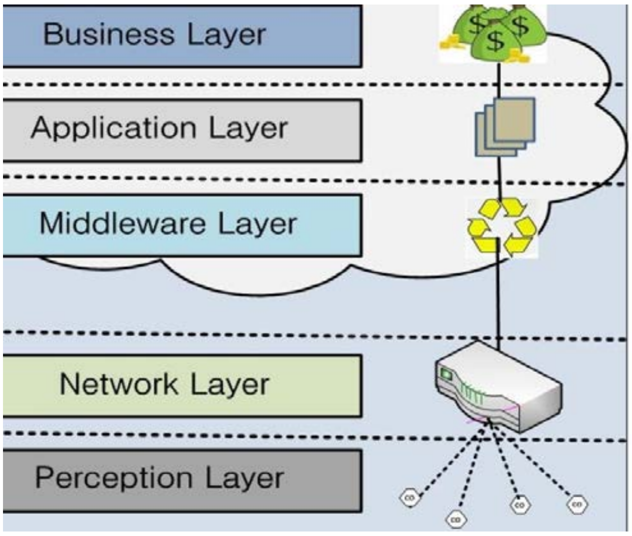


*Figure 3 :Internet of Things layers (Aazam & Huh, 2014)*

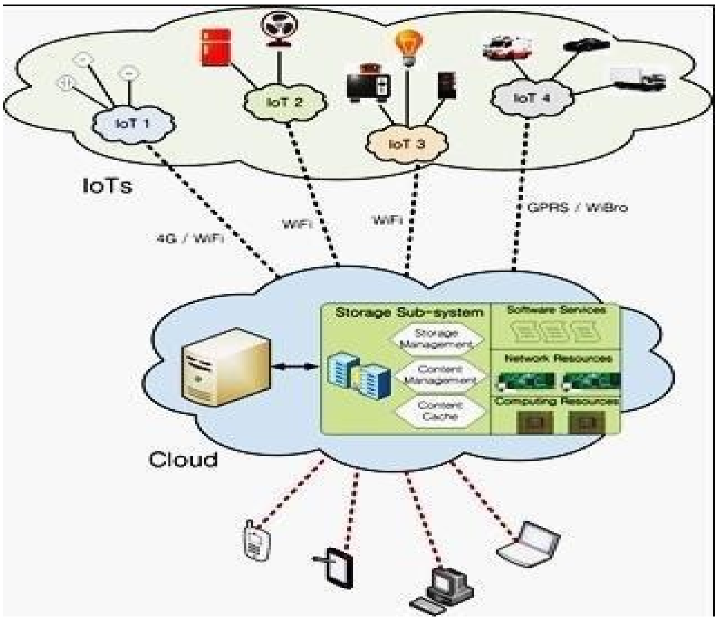


*Figure 4: Cloud and Fog of Things –data communication (Aazam & Huh, 2014)*

**Big Data Analytics**

Companies, groups, and even research organisations may amass vast volumes of information in a variety of sectors. "Big data" is defined as a vast volume of unstructured, semi-structured, or hierarchical information that is continually transmitted to and across businesses (Mehdipour et al., 2019; Shen et al., 2020; Khalid & Zeebaree, 2021). Big Data has been around for a while, and many businesses have realised that analytics can be used to extract useful knowledge from their data. Market analysis is a type of applied analysis that contains complicated component applications such as predictive


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modelling and mathematical algorithms. If the analysis is backed by high-performance analytical systems, Big data research is used to address critical issues about business processes and performance. Big data analysis examines vast amounts of data in order to uncover hidden trends, connections, and other results. For large-scale data processing, a batch or simplified model might be utilised. This assures that some implementations store the data and create the result in this manner. Many time-critical operations, such as stock market analyses and results processing, create and anticipate data in real time (Anawar et al., 2018; Tuli et al., 2020; Patel et al., 2017).

Figure 5 depicts this.

## RELATED WORK

Fog computing has been used in many different IOT implementations; in this part, we will look at some of them and see how they fared under varied implementations and methodologies. Zhang and colleagues (2020) The Computation Service Center is built with a few independent random variables to reduce the need for maintaining the common computation matrix. The CS block resolves the long-term issue. With only a few independent random variables, the usual storage norm can be avoided. The block CS is used to address the long-running time issue. This research proposes a solution for privacy-assured fog computation using reliable industrial large-picture data processing. Malicious record tampering, measurement secrecy using faulty records, massive storage matrix capacity that needs an estimate, and long-run The time of CS reconstruction is explicitly determined in the proposed procedure, and the CS-based data integrity verification mechanism is employed to assess if the restored image has been exploited.

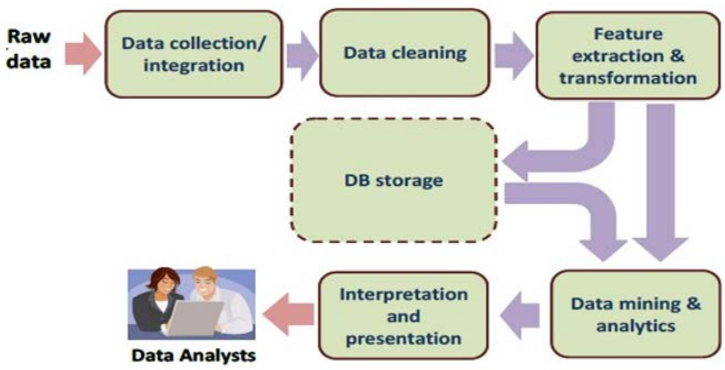


***Figure 5: Typical data analytics flow (Anawar et al., 2018)***


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The tampering study, compression efficiency analysis, primary sensitivity analysis, and restoration time analysis all reveal that the suggested strategy is viable and productive. In this post, Shen et al. (2020) suggested a novel data aggregation and security technique. In the estimate of fog as proposed by CS, the protocol allows CS to obtain all raw data and quantify preset functions while maintaining TD privacy. Terminal device exit and dynamic collaboration are realised. We would focus on developing more sophisticated data aggregation systems that can handle a wide range of data types while maintaining privacy. Nguyen et al. (2020) presented a multi-layer streaming analytics network with a two-tier fog layer that combines streaming and analytics (IoT-device, edge, fog, and cloud). This example demonstrates that our two-level fog test bed for CPS IoT applications is a flexible, efficient, and risk-free solution. Furthermore, testbeds may be used for research and instruction in courses such as distributed, parallel treatment, broadcasting, and data mining. As a result, the software is appropriate for private users and is cost-effective. We also provide an intelligent edge layer in the network to mimic the IoT-Device Layer mechanism in real time or to be directly connected to the IoT Device Layer. According to Etemadi et al. (2020), because IoT services experience workload variations over time, it is necessary to automatically provide the correct number of appropriate fog resources to fix IoT service workload modifications in order to avoid over- or under-provisioning problems when meeting QoS requirements. Because IoT services may experience workload variations over time, it is critical to automatically offer the appropriate amount of fog resources to accommodate IoT service workload changes in order to avoid over- or under-provisioning concerns while meeting QoS criteria. Finally, we demonstrate the effectiveness of our strategy using three operational load traces.

Ali et al. (2020) suggested an Innovative Computing Suggested Model incorporates Voluntary Computing (VC) and Fog Computing (FC) to facilitate the use of under-utilized free computing resources nearby fog machines. Hence, this will result in a massive amount of energy savings to use. To address the latency issue arising when moving space-intensive staff to cloud's distant data centers. We suggest the theoretical control of dispersed Fog and utilities (VSFC). Routing domains minimize delays and increasing the efficiency of the network We also Ali et al.


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(2020) proposed an innovative computing model. The proposed model combines voluntary computing (VC) with fog computing (FC) to take advantage of underutilised free computing resources around fog devices. As a result, this will result in enormous energy savings. to solve the delay issue that arises from relocating space-intensive personnel to the cloud's remote data centres. Theoretical control of distributed fog and utilities is proposed (VSFC). Routing domains reduce network latency while enhancing network efficiency. We have added fog sim to the VSFC assistance toolset. In FC-cloud and under medium-to-high network load, VSFC achieves exceptional latency gains of 47.5%, 93%, and 92%, respectively. Pop et al. (2020) presented the ICRA Platform (FCRA) for IoT applications. The FCP solution focuses on deterministic virtualization, which reduces the amount of protection and security interaction required; the middleware supports both essential control and dynamic Fog applications; the deterministic network and interoperability, which use the same standard as IEEE 802.1 Time Sensitive Network (TSN) and OPC Unified Architecture (OPC UA); We study the FCP reference architecture using the AADL and a set of industrial applications to assess its appropriateness for the Internet. Tuli et al. (2020) argued that the Health Fog, as a fog service, serves healthcare across IoT devices and effectively manages patient information when customer requests arise. The impact of latency is the primary reason why back-end loading is not faster (latency). We suggested and implemented a unique framework called Health Fog for creating edge computing devices that use deep learning techniques. Moghadas et al. (2020) presented a tracking method for controlling patients' well-being. The essence of this approach is fog estimation. and evidence processing for rhythmic patients. Instead of storing patient data, the gadget is used to increase data flow via the cloud. Cardiac failure, caused by difficulties with the heart's efficient operation, is now considered the world's second-leading cause of mortality. One example is a cardiac arrhythmia, which, if left untreated, can lead to irreversible hazards such as heart failure. An electrocardiogram (ECG) is one method to solve this problem. The goal is to propose a method for monitoring the patient's well-being (a case of cardiac arrhythmia). The gadget is controlled and operated using the Arduino electronic table and the AD8232 sensor module for cardiac rhythm and electrocardiography. As a result, the K-Nearest Neighbor (KNN) technique, which


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is used to detect and evaluate cardiac arrhythmias, is one of the most used data mining algorithms.

According to Yacchirema et al. (2018), obstructive sleep apnea (OSA) is one of the most serious sleep disorders since it directly affects one's quality of life. OSA can cause cognitive decline, reduced psychomotor output, behavioural problems, and personality issues. As a result, real-time surveillance of this disease is a critical necessity for health solutions. This study proposes a novel technique for detecting and promoting geriatric OSA therapy by evaluating a variety of characteristics such as sleeping environment, sleep status, physical activity, and physiological indicators, as well as the use of smart cities with accessible data. Cloud Storage Large Data tools are utilised for this processing. The studies conducted reveal a 93.3 percent reflectivity in the prediction of AQI to guide a treatment for OSA. According to Rabay'a et al. (2019), most IoT computers refer to cloud computing as an infrastructure for technical outsourcing. Peer-to-peer fog computing is a proposed methodology for improving fog computing's bandwidth efficiency in order to meet the ever-changing demands of IoT devices. Our Pair to Pear Fog model extends the fog machine architecture with the Peer to Peer Chord procedure. We also used PeerfactSim.KOM to simulate cloud computing, fog computing, and peer-to-peer fog computing for our claims. The outcomes of this study provide a solid foundation for future research that uses the p2p infrastructure to improve fog computing. The comparison of alternative P2P overlays to determine if the impacts of bandwidth and latency are amplified is one area of future exploration. More study is needed to verify the p2p fog model for applications that are more susceptible to delay, such as broadcasting. According to He et al. (2018), a smart area provides a multi-level fog computing network. Ad-hoc fogs and committed computer power neutrals make up the multi-level fog. The experiment's results indicate the analytical systems' performance against multi-stage fog as well as the practicality of the proposed QoS solutions. Fogs, rather than merely a cloud model, will significantly improve the output of intelligent city research systems in terms of job blocking likelihood and service efficiency. It offered a current fog computing model of basic working modules, with which we might avoid future processing power difficulties and poor cloud computing responses. According to ElHasnony et al. (2020), this article provides a complete


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examination of the Internet of Things and how the generated data may be efficiently utilised. In comparison to consolidated data storage and DDM, we still have cloud estimation, nebulization, and fog computing. Our ability is to adapt our suggested approach to real-world health, transportation, and energy issues. The REP tree method is among the most dependable, with a reliability ranging from 90.66% to 93.6%, depending on the details provided in the research. Although Bayes' naive method took longer to develop, it was the only one of four to calibrate the prototype.

***Table 1: Summary of Literature review related of Analysis from to Fog Computing to internet of thing (IoT).***

| Use Reference | Tools | Objective | Result and Accuracy |
|---|---|---|---|
| (Zhang et al., 2020) | MATLAB | Just a few ways, the CSC is designed to solve a broad storage space need by utilizing a common matrix for the calculation. Independent random variables. The CS block will be advantageous as the flow rate reduces. | Maintenance analysis, compression efficiency analysis, primary sensitivity analysis, Restauration analysis demonstrate the feasibility and productivity of the proposed schema. |
| (Shen et al., 2020) | MNIST | The dynamic partnership and exit of terminal devices are achieved. | We would concentrate on designing more powerful systems of data aggregation that handle diverse data types and safeguard privacy. |
| (Nguyen et al., 2020) | Testbed | This case shows that our two-tier fog testbed for CPS-dependent IoT applications is a scalable, effective and low-risk solution. In addition, test beds can also be used for testing and training in distributed/parallel computing, streaming and data analytics schools. | The site for 'private' users is thus suitable and accessible. Furthermore, we are adding an intelligent edge layer to the network to abstract and Simulate the mechanism of the IoT layer in real time or to be explicitly connected to the IoT system layer. |
| (Etemadi et al., 2020) | iFogSim toolkit | The workload of IoT resources can vary over time. In order to prevent over-or under-supply of problems in the fulfillment of QoS requirements, the appropriate fog tool needs to be established. | Lastly, we affirm the feasibility of our approach under three operating load traces. |

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|---|---|---|---|
| (Ali et al., 2020) | iFogSim toolkit | Addressing the issue of higher latency bytransferring data-intensive workers to distant data centers in the cloud. | We recommend volunteering with you. The interaction between these two distributed computers is explored, funded as a computational model (VSFC). Domains that help reduce cloud storage, capital utilization, and network use intrinsic delays. To this end, we expanded the toolkit to support VSFC for Fog Sim. Comprehensivesimulations reveal that by decreasing the latency by 47.5%, FC cloud by 93%, and the FK cloud by 92%, under uniform heavy load networks, VSFC issuperior to conventional. |
| (Pop et al., 2020) | TELSA | The FCP concentrated on virtualization ofdetergents, minimizing the security and security initiative, promoting critical Fog applications, and dissuasive and interoperability networking using open standards, for example, IEEE 802.1 Time-Sensitive Networking (TSN) and OPC Unified Architecture (OPC UA); | The framework for describing and analyzing the architecture of reference is suggested. In order to model the FCP architecture reference architectureswe use the AADL (Architecture Analysis Design Language) and collected industrial cases to define their suitability for IoT. |
| (Tuli et al., 2020) | Cooja | The main idea is to load a large volume of (big data) data from the consolidated storage and from the database into the cloud data centers, thereby restricting the use of latency-sensitive technology such as health tracking and surveillance systems. | We suggested the implementation of a new method,named Health Fog for the real application of automatic detection of heart illness, in order to integrate deep learning into Edge computing systems. |
| (Moghadas etal., 2020) | MATLAB | Because of numerous cardiac problems, coronary disease is considered world's second leading cause of death. One is cardiac arrhythmia, which, if not treated, may contribute to irreparable risks, including heart failure. The electrocardiogram (ECG) of a patient is anapproach to this disorder. | The purpose is to suggest how to monitor the well- being of a patient (a case of cardiac arrhythmia). Inorder to control and operate the device, Arduino electronic table and AD8232 sensor module are attached for monitoring heart rhythm and electrocardiography. Therefore, the algorithm k- Nearest neighbor, used for detection and validationof cardiac arrhythmias, is one of the most common data mining algorithms. |
| (Yacchirema etal., 2018) | MATLAB | This study provides a pioneering method for defining and encouraging elderly OSA care through the monitoring of different variables, for instance sleeping conditions,sleep state, physical activity, and physiological parameters, and the use of available data in smart cities. | For this processing, Cloud Storage Large Data toolsare used. The experiments carried out display a 93.3 percent reflectivity in the prediction of AQI tosteer A cure for OSA. |


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| | | | |
|---|---|---|---|
| (Rabay'a et al., 2019) | P2P Simulation tool | In this document, we examine the p2p model of fog, used to exchange a file program, and explain increased bandwidth performance in contrast with cloud simulation and fog calculation models. | In the results of this report, the potential work onfog computation utilizing the p2p mechanism is fully endorsed. |
| (J. He et al., 2018) | Raspberry Pi computers | It suggested a modern Fog Calculator model with simple usable modules that could alleviate the potential problems ofcommitted Resources and inadequate cloud response. | The experimental results demonstrate that analytical facilities may rely on the fog across many stages and that the proposed QoS schemes can be introduced. Fogs will greatly enhance the efficiency of an intelligent town analysis framework comparedto a cloud-only model in terms of job blocking likelihood and service utilization. |

## DISCUSSION

The discussion of fog computing capabilities introduces the most recent IoT technology requirements. The associated central fog device is shown below. accumulation of significant data and storage close to the end-user, given that only the cloud data centre administers the storage device. Large amounts of data must be accumulated in order to process end-user or IoT devices at a nearby location. Reduce the computational aspects of the fog framework, such as processing. In (Nguyen et al., 2020), for example, the application proposed a solid multi-layer, two-tier fog layer streaming analytical framework. Furthermore, the data imply that the platform is acceptable and affordable for "private" consumers. A unique Health Fog approach for automated analysis of heart disease, for example, has been proposed in (Tuli et al. 2020). Furthermore, the results show that smart layering for the IoT-device layer phase may be replicated in real-time. We propose a unique approach called "Health Fog" for automated heart disease detection. A multi-tier fog computing device with a comprehensive data processing service, for example, is recommended for smart city applications (Moghadas et al., 2020). sensor data from the Internet of Things (IoT). Furthermore, the data imply that analytic setups can be reliable against multi-level fog. The use of fog is intended to boost the performance of future artificial intelligence technology. In terms of the major utility metrics of the three use cases, the examples show that our suggested algorithms beat the baseline algorithms by at least 30.3 percent. Several active efforts aim to improve our fog computing system.


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## CONCLUSION

Computing with fog is becoming an increasingly significant element of our daily lives. It has the ability to link practically everything on our planet with everything else. IoT systems are intricately designed and have limited storage and processing space. However, the classic structure of the cloud has several flaws, such as excessive latency and network failure.

To solve these concerns, fog computing has been built as a cloud extension. However, unlike IoT computers, where fog nodes store all the data and latency is decreased, particularly for time-sensitive applications. The adoption of IoT fog computing would provide significant benefits for a wide range of IoT applications. In this article, we looked at the most recent fog computation, as well as an evaluation of fog qualities. The subject also emphasised different fog-enhanced IoT technologies.

Difficulties with fog and unresolved questions are also addressed in the inclusion of IoT. In summary, the purpose of this study was to summarise recent research contributions to our IoT and fog computing technologies, as well as to demonstrate the pathways for possible research and available difficulties with the integration of fog computing with the IoT.

## REFERENCES

1. Baucas, M. J., & Spachos, P. (2020). Using Cloud and Fog Computing for Large Scale IoT-based Urban Sound Classification. Simulation Modelling Practice and Theory, 101, 102013. https://doi.org/10.1016/j.simpat.2019.102013

2. Ali, B., Pasha, M. A., Islam, S. ul, Song, H., & Buyya, R. (2020). A Volunteer Supported Fog Computing Environment for Delay-Sensitive IoT Applications. IEEE Internet of Things Journal, 1–1. https://doi.org/10.1109/JIOT.2020.3024823

3. Aburukba, R. O., AliKarrar, M., Landolsi, T., & El-Fakih, K. (2018). Scheduling Internet of Things Requests to Minimize Latency in Hybrid Fog-Cloud Computing. Future Generation Computer Systems, 26.


Page 94-108 © MANTECH PUBLICATIONS 2022. All Rights Reserved

4. Aazam, M., & Huh, E.-N. (2014). Fog Computing and Smart Gateway Based Communication for Cloud of Things. 2014 International Conference on Future Internet of Things and Cloud, 464–470. https://doi.org/10.1109/FiCloud.2014.83

5. Kaur, A., Singh, P., & Nayyar, A. (2020). Fog Computing: Building a Road to IoT with Fog Analytics. In S. Tanwar (Ed.), Fog Data Analytics for IoT Applications (Vol. 76, pp. 59–78). Springer Singapore. https://doi.org/10.1007/978-981-15-6044-6_4

6. He, J., Wei, J., Chen, K., Tang, Z., Zhou, Y., & Zhang, Y. (2018). Multitier Fog Computing With Large-Scale IoT Data Analytics for Smart Cities. IEEE Internet of Things Journal, 5(2), 677–686. https://doi.org/10.1109/JIOT.2017.2724845

7. Shen, X., Zhu, L., Xu, C., Sharif, K., & Lu, R. (2020). A privacy-preserving data aggregation scheme for dynamic groups in fog computing. Information Sciences, 514, 118–130. https://doi.org/10.1016/j.ins.2019.12.00

8. Saleem, S. I., Zeebaree, S. R. M., Zeebaree, D. Q., & Abdulazeez, A. M. (2020). Building Smart Cities Applications based on IoT Technologies: A Review. 62(03), 11.

9. Rabay’a, A., Schleicher, E., & Graffi, K. (2019). Fog Computing with P2P: Enhancing Fog Computing Bandwidth for IoT Scenarios. 2019 International Conference on Internet of Things (IThings) and IEEE Green Computing and Communications (GreenCom) and IEEE Cyber, Physical and Social Computing (CPSCom) and IEEE Smart Data (SmartData), 82–89. https://doi.org/10.1109/iThings/GreenCom/CPSCom/SmartData.2019.00036

10. Mehdipour, F., Javadi, B., Mahanti, A., & Ramirez-Prado, G. (2019). Fog Computing Realization for Big Data Analytics. In R. Buyya & S. Narayana Srirama

 Page 94-108 © MANTECH PUBLICATIONS 2022. All Rights Reserved

(Eds.), Fog and Edge Computing (pp. 259–290). John Wiley & Sons, Inc. https://doi.org/10.1002/9781119525080.ch11

11. He, J., Wei, J., Chen, K., Tang, Z., Zhou, Y., & Zhang, Y. (2018). Multitier Fog Computing With Large-Scale IoT Data Analytics for Smart Cities. IEEE Internet of Things Journal, 5(2), 677–686. https://doi.org/10.1109/JIOT.2017.2724845


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