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Paper Title: Challenges in Conglomerating Fog computing with IOT for building Smart City

Paper link: https://ieeexplore.ieee.org/document/9784648

1 Summary :

1.1 Motivation/Purpose/Aims/Hypothesis :

The purpose of the research is to explore the drawbacks that centralized cloud systems present for IoT (Internet of Things) devices and analyze how Fog Computing might be used to lower latency and improve efficiency. Fog Computing with the Internet of Things (IoT) is thought to be able to produce stronger and more efficient smart city infrastructure.

1.2 Contribution

Providing the features, uses, and limitations of fog computing within the framework of smart cities constitutes the paper's primary contribution. This leads to the development of more efficient smart city solutions by demonstrating how Fog Computing could enhance the IoT devices' performance and reliability.

1.3 Methodology

The method should include an in-depth examination of the current state of information and previous studies in the area. It includes an in-depth review of fog computing's characteristics and applications as well as the challenges and limitations involved in integrating it with the Internet of Things for the development of smart cities.

1.4 Conclusion

The study comes to the conclusion that fog computing, when integrated with IoT, has several benefits across a range of sectors, including smart grids, smart agriculture, traffic control, waste and water management, and healthcare. Future smart cities could benefit greatly from this integration, which could also open the door to more technologically advanced and environmentally friendly urban areas.

2 Limitations

2.1 First Limitation/Critique

The initial limitation is related to storage, as local or end devices could not have the processing power or storage capacity to finish activities. This constraint makes it difficult to apply fog computing in the infrastructure of smart cities in an effective way..

2.2 Second Limitation/Critique

The second limitation of fog computing is its security issues, which arise from the devices' decentralized architecture and susceptibility to hacks and data breaches. In order to ensure the authenticity and integrity of smart city systems, this security issue must be resolved.

3 Synthesis

The topics discussed in this research have important implications for future scopes and potential uses. Fog Computing with IoT integration has the potential to completely transform smart city infrastructure, resulting in increased security, lower energy consumption, increased efficiency, and improved control of resources. Furthermore, the various and extensive effects of Fog Computing on the future of urban living are demonstrated by its possible uses in smart grids, smart farming, traffic control, water and waste management, and healthcare.

3.1 1st potential/idea of a new/follow-up/extension paper:

Alternate distributed allocation of time reuse patterns in Fog-enabled cooperative D2D networks

This paper addresses the time reuse problem in fog-enabled cooperative networks, focusing on device-to-device (D2D) communication. The authors demonstrate that optimal network performance can be achieved by activating only a limited number of time reuse patterns, despite the exponential increase in possible patterns as the number of devices grows. They propose a semi-distributed algorithm called ADARP (Alternate Distributed Allocation of Time Reuse Patterns) based on the alternate convex search (ACS) method and the alternating-direction method of multipliers (ADMM). This algorithm efficiently identifies the optimal time reuse profile and corresponding association strategies in fog-enabled cooperative D2D networks. The semi-distributed nature of ADARP makes it particularly suitable for these networks. The paper's findings are supported by numerical simulations, which validate the effectiveness of the proposed approach.

3.2 2nd potential/idea of a new/follow-up/extension paper:

Fog Computing with P2P: Enhancing Fog Computing Bandwidth for IoT Scenarios

This paper addresses limitations in cloud computing for handling growing IoT device demands, particularly issues with bandwidth, latency, and real-time responses. While fog computing was introduced to mitigate these problems, the authors propose a further enhancement: a peer-to-peer (p2p) fog model. This new approach enables fog nodes to collaborate, reducing reliance on cloud resources and processing more requests locally.The researchers tested their p2p fog model using a file sharing application scenario. They conducted simulations comparing cloud computing, traditional fog computing, and their proposed p2p fog computing model. Results indicate that the p2p fog model outperforms both cloud and conventional fog computing in terms of bandwidth throughput.The study concludes by suggesting that this p2p fog model could serve as a foundation for future developments in fog computing architectures, potentially leading to more efficient and responsive systems for IoT devices.