

**CIS-490H Edge Computing**

**With Dr. Zheng Song**

**Paper Review: Week 3**

**EdgeIoT: Mobile Edge Computing for Internet of Things**

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**18 January 2023**

# 1. Summary.

## (1) Motivation

The motivation of this paper is to reduce latency and provide future service capacity for the anticipated future number IoT and the data that they would possibly generate. Also, the edgeIoT idea would help reduce traffic in the network core and thus boost the overall internet core.

## (2) Contribution

The authors contribute to the growing interest in and use case of edge and fog computing paradigms by providing a framework by which IoT devices can communicate more effectively (i.e. less latency).

## (3) Methodology and/or argument

They propose using a hierarchy of fog nodes – which are essentially computational devices that would be connected to network base stations – specifically cell towers. Each fog node would support IoT devices by providing computational power in the form of Proxy Virtual Machines (VMs) that can support various applications specific to all of the IoT devices a user has in their possession. These applications would run as VM applications on top of the proxy VM, and each proxy VM can support multiple users and their respective cluster of IoT devices.

They then introduce a way to migrate proxy VMs between fog nodes to account for user (and thus device) mobility, including an optimization strategy that keeps network core traffic as low as possible and latency for the user as low as possible at the same time when determining when and how to migrate a VM. This determination process would be supported by a SDN (software-defined network) infrastructure, which would replace existing cellular network mechanisms. This SDN approach needed in the cellular network would be supported by open flow access and core switches in the cellular network, to provide the infrastructure to run and manage the SDN network.

## (4) Conclusion

Overall, the authors conclude that there are some challenges to overcome to implement the edgeIoT, but that their solutions and current predictive work on human movement behavior can support their solutions to making this a feasible reality.

# 2. Critique.

Once again, while I understand that data analysis and predictions is a part of doing research, it can be a bad reason to justify a novel infrastructure addition to our current internet structure. For example, the paper used predictions that by 2019, data generated on the internet would approach more than 500 ZB; however, I looked up the figures for as recent as 2022 and it is estimated that only 1/5<sup>th</sup> of that 2019 projection (just under 100 ZB were generated in 2022) (<https://www.domo.com/data-never-sleeps>). That is a very large margin of error especially because that is a 2022 value; the factor by which that projection is off is likely worse if I found the estimate for total data generated in 2019.

I encourage more researchers to generate ideas, whether it be adaptations and upgrades or novel applications, that focus more on current and historical values to justify the useability and benefit of their research idea. For example: do not make a prediction based on current and historical data, and then use

the projected values (especially 4 or 5-year outlooks) to for justification. A prediction of what we *may* need based on other predictions usually results in a weaker final prediction. Instead, simply use that historical and current data to justify ways we can make improvements so that you are only making *one* strong prediction about how and why we need a solution to some problem.

### 3. Synthesis.

I noticed that data was gathered in a province in China and analyzed human movement. I also noticed that it used information aggregated and analyzed on fog nodes. Thus, this work heavily relies on these fog nodes in order to implement the edgeIoT. I would propose that this work mention if the province in China used cellular infrastructure that implemented SDN. In doing this, it can support a much stronger argument that their proposed solution is feasible.

Also, I would suggest exploring options to implement this without relying on upgrading the current cellular infrastructure with SDN methods. They could find out if there is a way to adapt this idea and still improve communications between IoT devices using edge computing devices (like fog nodes) and the current, existing cellular infrastructure.