

## Assignment #5

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An interesting and new development, Machine Learning in IoT, is presented in this survey paper titled "A survey on application of machine learning for Internet of Things" by Laizhong Cui, Shu Yang, Fei Chen, Zhong Ming, Nan Lu, Jing Qin published online on 11 June 2018 at the International Journal of Machine Learning and Cybernetics.

As pointed out by the journal paper, Internet of Things (IoT) is becoming a new pervasive and ubiquitous network paradigm offering distributed and transparent services. IoT applications are developed to provide more accurate and more fine-grained services to users. These IoT big data can be further processed and analysed to provide intelligence for the IoT service providers and users by utilizing artificial intelligence approach.

The paper presents an optimistic view that machine learning can bring a potential benefit to computer networks. As we know that, previous research studied how to utilize machine learning to solve networking problems, including routing, traffic engineering, resource allocation, and security for Intrusion detection. Machine learning has been regarded as the key technology of autonomous smart/intelligent network management, operations and security.

The authors rightly pointed out how Security problems in IoT networks are more and more important with the increasing number of attacks nowadays. The IoT networks are more vulnerable than traditional network because of the characteristics of IoT devices and communication protocols. For example, IoT devices are usually equipped with lower battery and micro-controller, thus it is easy to be flooded. IoT devices communicate with each through Bluetooth, ZigBee, WIFI or GSM, which are more vulnerable to attacks.

The authors then present challenges in edge computing and Software defined networks (SDNs). As we know, edge computing is an emerging computing paradigm which means computing at devices or near the user to support faster performance in IoT. SDNs, due to the complexity of IoT, the control plane needs machine learning for better management of the networks. The control plane makes up the network architecture component that defines the traffic routing and network topology.

The survey paper, in the next section discusses IoT Applications in healthcare and industry and how machine learning can cater to reduce the increasing complexities. Authors discussed a research paper that innovated a system that can detect the human presence using IoT devices, and do not rely on devices, like cameras and motion detectors, that explicitly detect human presence. Also, an agriculture system that can monitor the environment conditions of vineyard, and predict the grape diseases in its early stages using hidden Markov model is discussed.

We then move to the last portion that concludes the survey paper by presenting learned facts and future research-worthy propositions. The authors find that despite the recent wave of success of machine learning for networking, there is a scarcity of machine learning literatures about its applications for IoT services and systems, which this survey aims to address.

The researchers tried to cover the major applications of machine learning for IoT and the relevant techniques, including traffic profiling, IoT device identification, security, edge computing infrastructure, network management based on SDN, and typical IoT applications. However, more research and clarity is required to take the step towards machine learning for Internet of Things really possible.

All in all, the survey paper is an interesting resource for someone who is ready to delve deep into the idea of Machine learning with IoT and is filled with amplified enthusiasm for providing futuristic yet practical research solutions to solve the most common problems in IoT, using Machine learning to realise implementable improvisations.

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