

CALL FOR PAPERS
IEEE Transactions on Big Data
Special Issue on Edge Analytics in the Internet of Things

The cloud-based Internet of Things (IoT) that connects a wide variety of things including sensors, mobile devices, vehicles, manufacturing machines, and industrial equipments, etc. is changing the way we live. IDC forecasts that the IoT will grow to 50 billion connected devices by 2020, and will generate an unprecedented volume and variety of data. However, moving this big volume of data from the network edge to a central data center for processing and analysis not only adds latency but also consumes network bandwidth. Therefore, the cloud-based IoT with a centralized data center may not be able to enable smart environments, such as cities, homes, schools, etc., or smart systems, such as automated vehicles, traffic controls, factories, etc., whose data need to be analyzed and acted on quickly. This is especially true in scenarios such as health monitoring or autopilot, where milliseconds can have fatal consequences. Such demand indicates that data processing and analysis has to be performed where the data are collected or generated instead of waiting for the data to be sent back to the centralized data center. Also, often these smart environments or systems need to be capable of self-monitoring, self-diagnosing, self-healing, and self-directing, and thus the task of edge-based data analytics may need to incorporate the technology of machine learning. Thus, there is a need to find a way to push intelligence from the central data center to the edge of the network. Indeed, IDC also predicts that up to 40% of IoT data will need edge-based analytics for applications that need real-time action. To solve this issue, *fog computing*, in which a set of interconnected micro data centers, called fog nodes, are deployed in between the things and the cloud data center, has been adopted as a bridge linking IoT devices and their remote data center. Since a fog node can run IoT-enabled applications for real-time data analytics with millisecond response time, fog computing enables application services of the IoT to be performed close to their consumers, and has created an emerging technology – edge analytics. Meanwhile, some IoT things are getting more capable and more powerful, making edge-based analytics possible. On the other hand, for the moment, most of the IoT things still do not have the computing and storage resources to perform intelligent analytics directly. For such IoT things, a nearby fog node or cloudlet may perform the tasks on their behalf. Furthermore, since data sources are widely distributed, some analytics tasks may need to be collaboratively performed by a set of fog nodes working together with some IoT things. As such, orchestrating fog nodes by means of topology control and network function virtualization may leverage the edge analytics performance.

Though edge analytics is in its nascent stage, it is getting more and more popular. The goal of this special issue is to provide a forum for researchers working on IoT and fog computing to present their recent research results in edge analytics. Topics of interest include, but are not limited to:

- Software infrastructure for fog/edge nodes
- Middleware support for edge analytics
- Edge-based real-time applications in smart cities
- Edge-based real-time applications in vehicular systems
- Edge-based real-time applications in health monitoring and management
- Edge-based real-time applications in cyber-physical system
- Machine learning algorithms that leverage edge analytics performance
- Network function virtualization technologies that leverage edge analytics performance
- Load balancing and service selection at the edge
- Reliability and fault tolerance issues in edge-based real-time applications
- Security and privacy issues in edge-based real-time applications

Only original and unpublished research papers will be considered. This special issue will also consider the papers that have been previously published in the proceedings of reputed conferences provided the version to be submitted to this special issue is with at least 40% new contents/results (including significant new contributions/original ideas) and that comply with the copyright regulations, if any.

Authors should follow the TBD manuscript format described in the Information for Authors website at <https://www.computer.org/portal/web/tbd/author>. Prospective authors should submit their papers in pdf format through TBD paper submission system (<https://www.computer.org/web/tbd/author>) according to the following timetable. For additional information regarding this special issue, please contact David S. L. Wei at dsl.wei01@gmail.com.

Important Dates

Manuscript submission deadline: February 1, 2018

First reviews complete: April 1, 2018

Revision due: June 1, 2018

Second reviews complete/acceptance letters sent: August 1, 2018

Final manuscript due: September 1, 2018

Publication date: 4th quarter, 2018

Guest Editors

- David S. L. Wei, CIS Dept., Fordham University, USA, dsl.wei01@gmail.com
- Danny Krizanc, Dept. of Maths and CS, Wesleyan University, USA, dkrizanc@wesleyan.edu
- Sanguthevar Rajasekaran, Dept. of CSE, University of Connecticut, USA, rajasek@engr.uconn.edu
- Yennun Huang, Academia Sinica, Taiwan, yennunhuang@gmail.com
- Yu-chee Tseng, Computer Science Dept, National Chiao Tung University, yctseng@cs.nctu.edu.tw
- Kanta Matsuura, Institute of Industrial Science, University of Tokyo, Japan, kanta@iis.u-tokyo.ac.jp