Best Paper Award at IEEE GLOBECOM 2017

Chenwei Wang of DOCOMO Innovations, Inc. and joint research partners, Messrs. A. Salman Avestimehr and Mehrdad Kiamari of the University of Southern California received the Best Paper Award at the Institute of Electrical and Electronics Engineers Global Communications Conference 2017 (IEEE GLOBECOM 2017) held in Singapore December 4-8, 2017.

IEEE GLOBECOM is one of the two flagship conferences (the other is the International Conference on Communications (ICC)) sponsored by the IEEE Communications Society, the major society of the IEEE, the World's largest technical engineering association. The first IEEE GLOBECOM meeting was held in 1957, and this meeting was its 60th anniversary. In recent years, in addition to technical sessions in which academic papers are announced, the conference now includes industry programs to promote exchange of opinions on the latest ideas, trends and product innovations in the industry.

At this conference, 2,630 papers were submitted, 1,026 papers (39%) were accepted, and 15 outstanding papers from each field received "Best Paper Award." The paper awarded this time was entitled "On Heterogeneous Coded Distributed Computing" and was announced in the Communications Theory field.

Mobile edge computing aims to achieve low latency and high throughput per unit area by deploying computing resources closer to users than the cloud. The winning paper provides an approach based on distributed encoding technologies to satisfy the low-latency, high-throughput conditions in 5G and beyond 5G. Particularly, the paper studies the fundamental limits of latency performance through the use of distributed encoding under the MapReduce framework widely used for big data processing.

Specifically, the paper proposes a new approach by designing data file splitting and assignment and leveraging redundant computation to design encoding/decoding mechanisms and algorithms to optimize communications latency of computing systems. This technology is applicable to a wide range of applications for both radio and wired networks. For example, Internet of Things (IoT) applications entail the use of multiple sensors to collect various desired information. Applying this new technology in this area will not only shorten communications latency with separated information processing of sensors, but also strengthen security of overall systems through distributed encoding. Also, using this technology in self-driving car scenarios to enable extremely quick exchange of vehicle sensor-acquired data between vehicles will raise the ability of vehicles to learn traffic information over a wider range to promptly respond to emergency vehicles and speed up emergency responses (e.g., the timing of slowing down) to accidents in the vicinity.

This paper received the award for its highly appraised proposal for a distributed processing algorithm and its distributed encoding theory. Although edge computing for mobile systems is still in the pre-commercialization stage, the theoretical knowledge gained from this research promises to contribute to the development and advancement of DOCOMO's 5G and beyond 5G.