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Editorial

Cognitive Distributed Computing and Its Impact on Information Technology (IT) as We Know It †

Rao Mikkilineni

Chair of IS4SI-2017 Symposium on Cognitive Distributed Computing and Its Impact on It (Information Technology) as We Know it, C3DNA Inc., 7533 Kingsbury Ct, Cupertino, CA 95014, USA; rao@c3dna.com; Tel.: +1-408-406-7639

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The International Summit is4si-2017, Digitalisation for a Sustainable Society: Embodied, Embedded, Networked, Empowered through Information, Computation & Cognition, was held 12–16 June 2017 at Chalmers University of Technology Conference Center in Gothenburg, Sweden. The summit was organized by the International Society for the Study of Information in collaboration with the Chalmers University of Technology and the University of Gothenburg.

IS4SI 2017 Summit featured 4 symposia presenting the state of the art research. The symposium on "cognitive distributed computing and its impact on it (information technology) as we know it" was aimed at discussing the new advances in computer science infusing cognition into computing and data processing using the new artificial intelligence technologies. There were two main themes presented by the five speakers:

- As the scale of computations become large and as both people and machines demand communication, collaboration and commerce at the speed of light, rapid fluctuations in the demand for computing performance and fluctuations in available resource pools, both make it necessary to respond fast and readjust the computation structures and associated resources so as to not disrupt the user experience or the service transaction. Current Information Technologies from their memory-starved, server-centric, low-bandwidth origins from von Neumann's stored program control implementation of the Turing Machine are evolving with new architectures to meet the demand for scale and speed. The speakers discussed the evolution of current IT to cognitive IT, where computing processes become self-aware of their resource requirements in real-time and seek to adjust them from a global knowledge of available resource pools and their provisioning processes. This is transforming the current state of the IT as we know it to a cognitive IT. As presented by one of the speakers, new computing models recently proposed also seem to demonstrate higher resiliency, efficiency and tolerance to fluctuations in computation process evolution.
- A focus on structured knowledge representations as they have played a key role in enabling machine learning at scale was identified. The speakers highlighted recent case studies where knowledge structures when combined with the knowledge of the distributed computation graph have accelerated machine-learning applications by 10× or more. These concepts are extended to the design of Cognitive Distributed Learning Systems to resolve critical bottlenecks in real-time machine learning applications such as Predictive Analytics and Recommender Systems.

I would like to thank all of the speakers for their fine and dedicated work as well as all participants for their valuable contributions—presentations and numerous animated discussions that made the symposium such an inspiring and invigorating event.