Advanced Artificial Intelligence

Hoda Eldardiry, PARC, and Tadahiro Taniguchi, Ritsumeikan University

Recent advancements in the field of artificial intelligence has expanded the ability of knowledge acquisition and application through ***diverse and collaborative learning***. Learning has become diverse in terms of input modality, granularity, supervision, approach and application. Key to the impact of today's powerful learning mechanisms is the collaborative nature of learning. This means that learning systems no longer rely on one type of teacher. Instead learning leverages a variety of complementary players. The better these players can collaborate through an enriched communication channel, the more efficient the learning becomes. These collaborating players include the machine program, humans and physical systems; where each play various roles.

The machine program processes data streams, mines for interesting patterns, learns models of the world, and generates explanations of its results. Human experts demonstrate examples for teaching, while human system users provide feedback on the output. Physical systems also include sensing the environment, as well as capturing contexts and situations as they change. The Advanced Artificial Intelligence session covers a broad set of examples of diverse and collaborative learning at the edge of today's artificial intelligence state-of-the-art research.

Our first speaker, Leman Akoglu, will present anomaly detection techniques that enable diverse and collaborative learning by analyzing complex data streams incorporating human feedback and. Our second speaker, Ion Matei, will present techniques to address challenges in learning for physical systems in the absence of sufficient training data and physical system model information. Our third speaker, Takamitsu Matsubara will focus on reinforcement learning to enable robots to perform dynamic actions in physical environments. Our final speaker, Iku Ohama will conclude our session by presenting recent advances in statistical learning approaches to discover knowledge from data.