

Title: Cognitive Architecture for Operant Conditioning

Abstract

In this talk, I will present my research on cognitive architecture for operant conditioning. To lay the foundation for the discussion, I will start by reviewing the definitions and tests for AI and propose a new definition and the test for human-level artificial intelligence (HLAI). I claim that the essence of HLAI to be the capability to learn from others' experiences via language. Based on the definition, a test based on the language acquisition task will be proposed with the simulated environment to run the test practically. A next milestone toward programming HLAI would be enabling operant conditioning inspired by the 'Skinner box' experiment. To achieve this goal, I will explain two lessons that we can learn from the biological brain. First, the working principle of neocortex can be modeled as Modulated Heterarchical Prediction Memory (mHPM). In mHPM, autoregressive universal modules are connected in a heterarchical network, and they are update in a local and distributed way instead of current deep learning trend of end-to-end optimization based on the single objective function. mHPM implements the multi-modal world model. Second lesson is that we need non-homogeneous cognitive architecture for innate and learned behaviors instead of current homogeneous architecture. I will explain the role of innate components such as hippocampus, reward system, hypothalamus, and amygdala. Those innate components use the world model in mHPM enabling episodic memory formation and rapid adaptation.

Bio:

Dr. Deokgun Park is an assistant professor of the Computer Science and Engineering Department at the University of Texas at Arlington (UTA). He leads the Human Data Interaction Lab at UTA, which studies the Human-Level Artificial Intelligence. Dr. Park earned his doctoral degree from the University of Maryland in 2018. He completed M.S. in Interdisciplinary Engineering at Purdue University and M.S. in Biomedical Engineering at Seoul National University, where he also obtained a B.S. degree in Electrical Engineering. He worked at the Government and industry research labs, and startups. And his patents have been licensed to companies, including Samsung Electronics.

