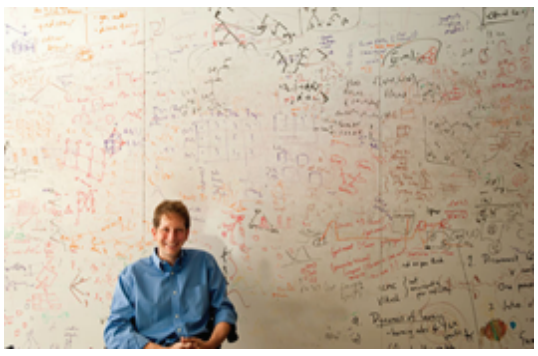
ML/Google Distinguished Lecture

Josh Tenenbaum

Professor of Computational Cognitive Science, MIT



Learning as Program Induction

Abstract:

What do people know about the world, and how do they come to know it? I will talk about recent work in cognitive science attempting to answer these questions in computational terms -- terms suitable for both reverse-engineering human learning and also building more human-like machine learning systems. This work follows in a long tradition of viewing knowledge as some kind of program, where learning then becomes a kind of program induction or program synthesis. By formalizing this classic idea using new tools for learning with probabilistic programs, it becomes more powerful both as a machine-learning approach and as a framework for describing and explaining human learning. I will discuss working models in several domains, including learning word meanings, learning the structural form of a data set or a covariance kernel for function estimation and time series analysis, learning programs that generate visual concepts, learning physical laws, and bootstrap learning via the acquisition of new inductive biases.

BIO:

Josh Tenenbaum received his Ph.D. in 1999 from MIT in the Department of Brain and Cognitive Sciences, where he is currently Professor of Computational Cognitive Science as well as a principal investigator in the Computer Science and Artificial Intelligence Laboratory (CSAIL). He studies learning, reasoning and perception in humans and machines, with the twin goals of better understanding human intelligence in computational terms and bringing computers closer to human capacities.

His group's current work focuses on building probabilistic models to explain how people come to be able to learn new concepts from very sparse data, how we learn to learn, and the nature and origins people's intuitive theories about the physical and social worlds, with a recent emphasis on probabilistic programming formalisms.

Their papers have received awards at several conferences, including CVPR, NIPS, UAI, IJCAI, the Annual Meeting of the Cognitive Science Society (CogSci), and the International Conference on Development and Learning (ICDL). He is the recipient of early career awards from the Society for Mathematical Psychology, the Society of Experimental Psychologists, and the American Psychological Association, along with the Troland Research Award from the National Academy of Sciences.

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Gates Hillman 6115

ML

Joint seminar by the Machine Learning Department at Carnegie Mellon University & Google Pittsburgh