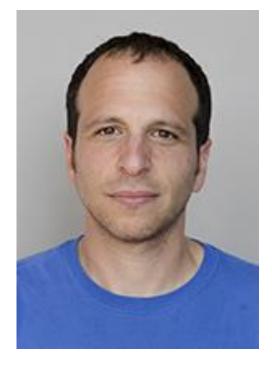# EPSTEIN INSTITUTE SEMINAR ▪ ISE 651

Optimization Challenges in Deep Learning

ABSTRACT – When training large-scale deep neural networks for pattern recognition, hundreds of hours on clusters of GPUs are required to achieve state-of-the-art performance. Improved optimization algorithms could potentially enable faster industrial prototyping and make training contemporary models more accessible.

In this talk, I will attempt to distill the key difficulties in optimizing large, deep neural networks for pattern recognition. In particular, I will emphasize that many of the popularized notions of what make these problems "hard" are not true impediments at all. I will show that it is not only easy to globally optimize neural networks, but that such global optimization remains easy when fitting completely random data.

I will argue instead that the source of difficulty in deep learning is a lack of understanding of generalization. I will provide empirical evidence of high-dimensional function classes that are able to achieve state-of-the-art performance on several benchmarks without any obvious forms of regularization or capacity control. These experiments reveal that traditional learning theory fails to explain why large neural networks generalize. I will close by proposing some possible paths towards a framework of generalization that explains these experimental findings.

Dr. Benjamin Recht
Associate Professor, UC Berkeley
Department of Electrical Engineering and Computer Science
Recipient of Presidential Early Career Awards for Scientists and Engineers; Alfred P. Sloan Research Fellowship

SPEAKER BIO – **Dr. Benjamin Recht** is an Associate Professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. Ben's research focuses on scalable computational tools for large-scale data analysis, statistical signal processing, and machine learning. He is the recipient of a Presidential Early Career Awards for Scientists and Engineers, an Alfred P. Sloan Research Fellowship, the 2012 SIAM/MOS Lagrange Prize in Continuous Optimization, the 2014 Jamon Prize, and the 2015 William O. Baker Award for Initiatives in Research.

USC Viterbi
School of Engineering
Daniel J. Epstein Department of Industrial and Systems Engineering

TUESDAY, FEBRUARY 21, 2017
3:30PM – 4:50PM
USC ANDRUS GERONTOLOGY CENTER (GER), ROOM 206