

**University of Chicago and Toyota Technological Institute at Chicago  
Machine Learning Seminar Series**

**PRESENTS:**



**Samory Kpoutufe, Associate Professor  
Columbia University**

**Title:** Some Recent Insights on Transfer Learning

**Abstract:** A common situation in Machine Learning is one where training data is not fully representative of a target population due to bias in the sampling mechanism or high costs in sampling the target population; in such situations, we aim to 'transfer' relevant information from the training data (a.k.a. source data) to the target application. How much information is in the source data? How much target data should we collect if any? These are all practical questions that depend crucially on 'how far' the source domain is from the target. However, how to properly measure 'distance' between source and target domains remains largely unclear.

In this talk we will argue that much of the traditional notions of 'distance' (e.g. KL-divergence, extensions of TV such as D\_A discrepancy, density-ratios, Wasserstein distance) can yield an over-pessimistic picture of transferability. Instead, we show that some new notions of 'relative dimension' between source and target (which we simply term 'transfer-exponents') capture a continuum from easy to hard transfer. Transfer-exponents uncover a rich set of situations where transfer is possible even at fast rates, helps answer questions such as the benefit of unlabeled or labeled target data, yields a sense of optimal vs suboptimal transfer heuristics, and have interesting implications for related problems such as multi-task learning.

Finally, transfer-exponents provide guidance as to \*how\* to efficiently sample target data so as to guarantee improvement over source data alone. We illustrate these new insights through various simulations on controlled data, and on the popular CIFAR-10 image dataset.

The talk is based on work with Guillaume Martinet, and ongoing work with Steve Hanneke.

**Bio:** I graduated (Sept 2010) in Computer Science at the University of California, San Diego, advised by Sanjoy Dasgupta. I then was a researcher at the Max Planck Institute for Intelligent Systems. At the MPI I worked in the department of Bernhard Schoelkopf, in the learning theory group of Ulrike von Luxburg. Following this, I spent a couple years as an Assistant Research Professor at the Toyota Technological Institute at Chicago. I then spent 4 years at ORFE, Princeton University as an Assistant Professor.

**Host:** Eric Jonas

**Friday, March 13, 10:30 – 11:30 am**

**JCL Rm 390**

(Remote broadcast at TTIC Rm 526)