



THE UNIVERSITY OF CHICAGO

Department of Statistics

STATISTICS COLLOQUIUM

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Incorporation of Geometry into Learning Algorithms and Medicine

TUESDAY, February 7, 2017, at 3:00 PM
STU 102, Harold Leonard Stuart Hall, 5835 S. Greenwood Ave.

ABSTRACT

This talk focuses on two instances in which scientific fields outside mathematics benefit from incorporating the geometry of the data. In each instance, the applications area motivates the need for new mathematical approaches and algorithms, and leads to interesting new questions. (1) The current empirical success of deep learning in imaging and medical applications, in which theory and understanding is lagging far behind. By assuming the data lies near low dimensional manifolds and building local wavelet frames, we improve on existing theory that breaks down when the ambient dimension is large (the regime in which deep learning has seen the most success). (2) A method to determine and predict personalized drug treatment effectiveness for patients based off their baseline information. This motivates building a function adapted diffusion operator high dimensional data X when the function F can only be evaluated on large subsets of X , and defining a localized filtration of F and estimation values of F at a finer scale than it is reliable naively.