

**University of California, Irvine  
Statistics Seminar**

***Distance Metrics for Testing Mutual Independence***

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4 p.m., 6011 Bren Hall  
(Bldg. #314 on campus map)**

In the first part of this talk, I will introduce new metrics which generalize the notion of distance covariance to quantify joint dependence among  $d \geq 2$  random vectors. Empirical estimators are constructed based on certain Euclidean distances between sample elements. I will present some results on the large sample properties of the estimators and propose a bootstrap procedure to approximate their sampling distributions. The new metrics are used to test the goodness of fit for directed acyclic graph in causal inference.

In the second part of this talk, I will introduce a new test for testing mutual independence and banded dependence structure for high dimensional-data. The test is constructed based on the pairwise distance covariance and it accounts for the non-linear and non-monotone dependences among the data, which cannot be fully captured by the existing tests based on either Pearson correlation or rank correlation. The test can be conveniently implemented in practice as the limiting null distribution of the test statistic is shown to be standard normal. It exhibits excellent finite sample performance in the simulation studies even when the sample size is small albeit dimension is high, and is shown to successfully identify nonlinear dependence in empirical data analysis.

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