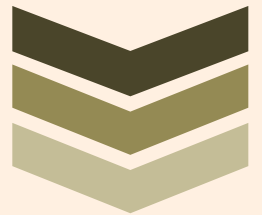## Asymptotic Distribution-Free Independence Test for High Dimension Data

by

Dr. Zhanrui CAI
Assistant Professor
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Date	:	**Tuesday, 14 Februrary 2023**
Time	:	**9:00 am - 10:00 am (Hong Kong Time)**
		Click here to join Zoom
Zoom Details	:	**Meeting ID: 987 0535 0916**
		Passcode: 753556

Abstract:

Test of independence is of fundamental importance in modern data analysis, with broad applications in variable selection, graphical models, and causal inference. When the data is high dimensional and the potential dependence signal is sparse, independence testing becomes very challenging without distributional or structural assumptions. In this paper, we propose a general framework for independence testing by first fitting a classifier that distinguishes the joint and product distributions, and then testing the significance of the fitted classifier. This framework allows us to borrow the strength of the most advanced classification algorithms developed from the modern machine learning community, making it applicable to high dimensional, complex data. By combining a sample split and a fixed permutation, our test statistic has a universal, fixed Gaussian null distribution that is independent of the underlying data distribution. Extensive simulations demonstrate the advantages of the newly proposed test compared with existing methods.

Bio:

Zhanrui Cai is currently a tenure track assistant professor at Department of Statistics, Iowa State University. He previously spent one year as a postdoc researcher at Carnegie Mellon University and obtained his PhD at Penn State University at 2021. His research interests include high dimensional data analysis, model-free inference, etc.