

Efficient distribution-free rank tests of vector independence

Abstract

In this talk we try to connect five keywords in statistics/probability — rank correlations, (degenerate) U-statistics, combinatorial (non-)CLT, optimal transport theory, and Le Cam's contiguity lemmas – through one theme, nonparametric independence testing. The corresponding results show the existence of consistent and statistically efficient distribution-free tests of independence between two random vectors for the first time. In technical terms, we give a new type of combinatorial non-central limit theorem for double- and multiple-indexed permutation statistics and a nontrivial use of Le Cam's third lemma with elements of non-normal limits.