

On the error bound in a combinatorial central limit theorem

Louis Chen

National University of Singapore

The notion of exchangeable pair is central to Stein's method. The use of concentration inequalities is an effective means for bounding the Kolmogorov distance in normal approximation. Let $\{X_{ij}: i, j = 1, \dots, n\}$ be independent random variables with finite 3rd moments and let π be a random permutation of $(1, \dots, n)$, independent of the X_{ij} . Let $U = \sum X_{i\pi(i)}$ and let $W = (U - EU)/(\text{Var}(U))^{1/2}$. In this talk we will use exchangeable pairs and the concentration inequality approach to obtain a 3rd-moment error bound on $|\mathbb{P}(W \leq x) - \Phi(x)|$, where Φ is the standard normal distribution function. This result includes the case where the X_{ij} are constants and the case of sampling without replacement from independent random variables. A self-normalized version of the problem will also be discussed. This talk is based on joint work with Xiao Fang.