FUDAN UNIVERSITY

Applied Math Ph.D. Seminar

Bernstein-type Inequality for Markov Chains and Non-asymptotic Estimates for Transition Matrices

Speaker: Xiangyuan Li (Peking University)

Time: 2024-11-07, 16:10 to 17:00

Location: Rm 1801, Guanghua East Tower

Advisor: De Huang (Peking University)

Abstract: Concentration inequalities describe the probability that the average of a sequence of random variables is close to its expected value. In particular, the concentration of Markov chains has been an extensively studied topic. In this talk, we first introduce a new Bernstein-type inequality for general Markov chains via an elementary approach. Compared with existing works, our result only requires the Markov chain to satisfy an iterated Poincaré inequality. In the second part of this talk, we study the inverse problem of estimating the transition matrix of a given Markov chain. We show the robustness of our Bernstein-type inequality by establishing non-asymptotic error bounds for the classical MLE method. Meanwhile, in the reversible case, we propose a new reversibility-preserving online SCE method with non-asymptotic deviation bounds.