



Colóquio Interinstitucional

Modelos Estocásticos e Aplicações

Quarta-feira, 22 de novembro de 2023

Programa

14:00 – 15:20 – Philip Thompson (FGV EMap)

Outlier-robust additive matrix decomposition and robust matrix completion

We study least-squares trace regression when the parameter is the sum of a r -low-rank matrix with a s -sparse matrix and a fraction ϵ of the labels is corrupted. For subgaussian distributions, we highlight three needed design properties, each one derived from a different process inequality: the “product process inequality”, “Chevet’s inequality” and the “multiplier process inequality”. Jointly, these properties entail the near-optimality of a tractable estimator with respect to the effective dimensions $d_{\text{eff},r}$ and $d_{\text{eff},s}$ for the low-rank and sparse components, ϵ and the failure probability δ . The near-optimal rate has the form $r(n, d_{\text{eff},r}) + r(n, d_{\text{eff},s}) + \sqrt{(1 + \log(1/\delta))/n} + \epsilon \log(1/\epsilon)$. Here, $r(n, d_{\text{eff},r}) + r(n, d_{\text{eff},s})$ is the optimal rate in average when there is no contamination. Our estimator is adaptive to (s, r, ϵ, δ) and, for fixed absolute constant $c > 0$, it attains the mentioned rate with probability $1 - \delta$ uniformly over all $\delta \geq \exp(-cn)$. Disconsidering matrix decomposition, our analysis also entails optimal bounds for a robust estimator adapted to the noise variance. Finally, we consider robust matrix completion. We highlight a new property for this problem: one can robustly and optimally estimate the incomplete matrix regardless of the magnitude of the corruption. Our estimators are based on “sorted” versions of Huber’s loss. We present simulations matching the theory. In particular, it reveals the superiority of “sorted” Huber’s losses over the classical Huber’s loss..

15:40 – 17:00 – Oliver Riordan (Oxford)

The chromatic number of random graphs

The chromatic number of a graph is the minimum number of colours needed to colour the vertices so that adjacent vertices receive distinct colours. While this sounds like a game, in applications it is a very important property, corresponding to the minimum number of groups a set must be divided into to avoid any incompatible pairs within each group. The chromatic number is also studied purely theoretically, which will be the point of view here.

A basic question is: considering all possible graphs on n vertices, what do their chromatic numbers look like? How often does each possible value occur? Or, rephrasing, what is the distribution of the chromatic number of a graph chosen uniformly at random? Writing X for this random variable, we can look for reasonable upper and lower bounds on the mean of X , and upper and lower bounds on the variance of X . For the last combination, nothing was known until a recent breakthrough of Annika Heckel. In this talk I will discuss some of the history of the problem, and try to describe some of the ideas Annika used, which she and I have since taken further.

17:00 – Discussão e lanche!

Local

Sala de reuniões do Decanato do CTC
12^o andar do prédio Cardeal Leme
PUC-Rio, Gávea

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