Learning Mixtures of Ranking Models

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Abstract

Probabilistic modeling of ranking data is an extensively studied problem with applications ranging from understanding user preferences in electoral systems and social choice theory, to more modern learning tasks in online web search, crowd-sourcing and recommendation systems. This work concerns learning the Mallows model – one of the most popular probabilistic models for analyzing ranking data. In this model, the user’s preference ranking is generated as a noisy version of an unknown central base ranking. The learning task is to recover the base ranking and the model parameters using access to noisy rankings generated from the model.

Although well understood in the setting of a homogeneous population (a single base ranking), the case of a heterogeneous population (mixture of multiple base rankings) has so far resisted algorithms with guarantees on worst case instances. In this talk I will present the a polynomial time algorithm which provably learns the parameters and the unknown base rankings of a mixture of two Mallows models.

Joint work with Avrim Blum, Or Sheffet and Aravindan Vijayaraghavan