

Informed Partition Models for Dependent Random Partitions

A seminar by Sally Paganin

The Ohio State University

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Room BENVENUTI

Department of Statistical Sciences

Model-based clustering is a powerful tool often used to discover hidden structure in data by grouping observational units that exhibit similar response values. Recently, clustering methods have been developed that allow the inclusion of an “initial” partition of the data informed by expert opinions, starting from a probability distribution on the space of partitions. Then, using some similarity criteria, partitions different from the initial one are down-weighted, i.e. they are assigned reduced probabilities. We take a different perspective and model the probability that each unit follows the initial partition via auxiliary variables. Our informed partition model provides flexibility to include varying levels of uncertainty to any subset of the partition (i.e., locally weighted prior information). Additionally, it can accommodate settings with multiple dependent partitions, such as temporal or multi-view data. Theoretical properties of the proposed construction are explored, which can be useful for prior elicitation. We illustrate the gains in prior specification flexibility via simulation studies and an application to a dataset concerning spatio-temporal evolution of PM10 measurements in Germany.



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