

Handling heterogeneous data with compound random measures-based models

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Room BENVENUTI

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Compound random measures (CoRMs, Griffin and Leisen, 2017) provide a flexible Bayesian nonparametric framework for analysing heterogeneous data divided into distinct groups, while enabling information borrowing across them. We present two modelling strategies based on CoRMs, designed to accommodate complex data structures arising in several settings. First, we develop a hierarchical model based on CoRMs that simultaneously performs distributional and observational clustering. This approach is particularly suited for applications in which observations are partitioned into predefined groups, such as experimental conditions, spatial regions, or individual subjects, that have a common latent structure, while allowing subsets of groups to share the same exact underlying distributions. Second, we introduce the autocompound random measure framework, in which we define a sequence of random measures, based on CoRMs, that allows for longitudinal borrowing of information over time. This formulation is appropriate in settings where the population structure is subject to temporal changes and must be modelled dynamically. For both modelling paradigms, we establish supporting theoretical and methodological results, including prior summaries, posterior behavior, and computationally efficient conditional sampling strategies.



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