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Finite and infinite exchangeability

Abstract

Exchangeability is ubiquitous in probability theory, with applications ranging from statistical mechanics to stochastic networks and bayesian inference. The classical result in this area is de Finetti's theorem that completely characterizes exchangeable probability measures on infinite products of a "nice" space (e.g., a Polish space). But what happens to exchangeable measures on finite products? It turns out that an analogous result holds, but the mixing measure may not be positive. We shall present a proof of this and show that no topological assumptions are needed whatsoever. We also ask the question of whether an exchangeable measure in n dimensions can be extended to n+1 or higher dimensions. (This is not always the case, and this is a problem that appears, e.g., in extensions of statistical physics models to higher dimensions). We give a necessary and sufficient condition for this, but we do require that the space be a locally compact Hausdorff space. This is joint work with Svante Janson and Linglong Yuan.