Introduction to non-parametric Bayes methods

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In parametric probability models, one distribution, which is characterized by a finite set of parameters, generates the data. Bayesian methods then define the belief distribution, dependent from model, prior distribution and data, on the parameter space. Non-parametric probability models consider the whole data-generating distribution itself (and therefore have inifinitely many dimensions). Consequently, non-parametric Bayesian methods investigate the belief distribution on a space of distributions. This belief distribution is again dependent from the data-generating distribution, a prior process (family of distributions) and the data.

Convergence theorems show that the unknown data-generating distribution here can approximatively be substituted by the interpolated empirical distribution of the data ([1], 177-179, 228). The selection of the prior process depends from what we expect how the posterior belief distribution is concentrated around the observed interpolated distribution. Prior processes must of course fit to the nature of the problem, e.g. spatial models ([2]) need other prior processes than models for time-dependent events ([3]).

A semi-parametric example with event times (nonparametric for event times, parametric for treatment effect) from the literature will be brought ([4], [5]).

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