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Graphical Monte Carlo and permutation tests for functions and images

Global envelopes are useful for graphical interpretation of the results in Monte Carlo and permutation tests based on functional or multivariate statistics. They have shown their usefulness already in many areas, e.g. in spatial statistics, functional data analysis, image and point pattern analysis with applications to ecology, neuroscience, forestry, economics, geography, material science, eye movement research etc. Graphical Monte Carlo goodness-of-fit tests are used particularly in spatial statistics, where the data are highly complex statistical objects, e.g. point patterns or random sets, and test statistics are one-dimensional functions. The global envelopes can however be defined for a general multivariate vector, i.e. for a function of any dimensions and also for an image, and the tested hypothesis extend beyond goodness-of-fit testing. This talk describes the global envelopes and shows their use also in graphical permutation tests for functions or images, including functional ANOVA and general linear model (GLM).