

Unparametrized multi-dimensional kernel density- and likelihood ratio estimator

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A novel method to estimate probability density functions, suitable for multivariate analyses will be presented. The implemented algorithm can work on relatively large samples, iteratively finding a non-parametric density function with adaptive kernels. With increasing number of sample points the resulting function converges to the real probability density. Specifically, we discuss a classification example, showing the optimal separation of signal and background events based on likelihood ratios. Unlike traditional classification methods, such as neural networks, this method is free from classical overtraining effects. Furthermore, as it is possible to calculate likelihood ratios depending on signal and background cross section, the method is suitable for small signal searches at LHC.

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