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Density Estimation Trees as fast non-parametric modelling tools

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Density Estimation Trees (DETs) are decision trees trained on a multivariate dataset to estimate its probability density function. While not competitive with kernel techniques in terms of accuracy, they are incredibly fast, embarrassingly parallel and relatively small when stored to disk.

These properties make DETs appealing in the resource-expensive horizon of the LHC data analysis. Possible applications may include selection optimization, fast simulation and fast detector calibration.

In this contribution I describe the bases of the algorithm and a hybrid, multi-threaded implementation relying on RooFit for the training, and on plain C++ for the evaluation of the density estimation.

A set of applications under discussion within the LHCb Collaboration are also briefly illustrated.

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