

# TMVA - Toolkit for Multivariate Data Analysis with ROOT

In high-energy physics, with the search for ever smaller signals in ever larger data sets, it has become essential to extract a maximum of the available information from the data. Multivariate classification methods based on machine learning techniques have become a fundamental ingredient to most analyses. Also the multivariate classifiers themselves have significantly evolved in recent years. Statisticians have found new ways to tune and to combine classifiers to further gain in performance. Integrated into the analysis framework ROOT, TMVA is a toolkit which holds a large variety of multivariate classification algorithms. They range from rectangular cut optimization using a genetic algorithm and from likelihood estimators, over linear discriminants and non-linear neural networks, to sophisticated more recent classifiers such as boosted decision trees, rule ensemble fitting and a support vector machine. TMVA manages the simultaneous training, testing, and performance evaluation of all these classifiers with a user-friendly interface, and expedites the application of the trained classifiers to data.

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