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Overview of the new ROOT statistical software

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ROOT, a data analysis framework, provides advanced mathematical and statistical methods needed by the LHC experiments for analyzing their data. In addition, the ROOT distribution include packages such as TMVA, which provides advanced multivariate analysis tools for both classification and regression, and RooFit for performing data modeling and complex fitting.
Recently a large effort is being put in improving these tools to make them suitable for LHC data analysis, by improving both their quality and performances. Algorithms like the minimization one, have been parallelized for a multi-thread or a multiple node environment. A set of new high level statistical software tools, RooStats, designed for establishing signal significance, estimating confidence level and for analysis combination, is being developed in close collaboration with the LHC experiments. The final goal is to provide a set of common standard implementations of statistical methods required by the experiments for the analysis of the LHC data. We present an overview of all these statistical methods emphasizing the recent developments which have been introduced in the latest ROOT release or they are planned for being released this year. Examples of these new developments are the new fitting classes of the core ROOT math library, multivariate regression analysis in TMVA, the ability to share and to make persistence the fitting model in RooFit and the new RooStats classes implementing the tools for calculating confidence intervals and performing hypothesis testing.

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