

Frontiers in particle physics through precision experiments and machine learning

Content

Machine learning (ML) methodologies have gained remarkable popularity in the high energy physics (HEP) community in recent years. This has improved the achieved precision of HEP experimental results. This work presents the study of novel ML techniques which address the problem of classification within experimental data to discriminate physics interesting versus background events. Specifically, it is focused on the combination of a number of individual classifiers through the so-called boosting ensemble algorithms. The novelty of this work resides on the use of a definite strong classifier as a component classifier in an ensemble, that is, support vector machines (SVMs); furthermore, different approaches to build the ensembles are explored. The previous considerations aim to improve the performance of a single SVM as being part of an ensemble and to be competitive with existing ML algorithms used as benchmarks by experimentalists (boosted decision trees and neural networks). The final goal of this effort is to apply the proposed algorithm to HEP measurements and reach precision frontiers. Early results on public available data will be presented.

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