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Incorporation of Systematic Uncertainties in the Training of Multivariate Methods

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Multivariate analyses in particle physics often reach a precision such that its uncertainties are dominated by systematic effects. While there are known strategies to mitigate systematic effects based on adversarial neural nets, the application of Boosted Decision Trees (BDT) so far had to ignore systematics in the training.
We present a method to incorporate systematic uncertainties into a BDT, the "systematics-aware BDT" (saBDT). We evaluate our method on open data of the ATLAS Higgs to tau tau machine learning challenge and compare our results to neural nets trained with an adversary to mitigate systematic effects.

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