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Uncertainty Aware Learning for High Energy Physics[1] AISHIK GHOSH, University of California, Irvine, BENJAMIN NACHMAN, Lawrence Berkeley National Laboratory, DANIEL WHITESON, University of California, Irvine — The use of machine learned classifiers for the measurement of parameters of interest has become ubiquitous in High Energy Physics (HEP) experiments. These models offer significant improvement in sensitivity compared to the traditional cut-based approach by exploiting subtle patterns in the high dimensional feature space, however, this also makes them highly sensitive to systematic uncertainties which lead to differences between the training and application datasets. Contrary to the traditional wisdom of keeping the decision criteria invariant to systematic effects, we study the use of a classifier that is fully aware of the systematic uncertainty in order to provide a better sensitivity to the parameter of interest. Studies are performed on a toy dataset as well as a more realistic HEP dataset, comparing our approach to typical baseline machine learning based approaches.

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