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Boost-Invariant Polynomials: an efficient and interpretable approach to jet tagging

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State-of-the-art prediction accuracy in jet tagging tasks is currently achieved by modern geometric deep learning architectures incorporating Lorentz group invariance, resulting in computationally costly parameterizations that are moreover complex and thus lack interpretability. To tackle this issue, we propose Boost Invariant Polynomials (BIPs) —a framework to construct highly efficient features that are invariant under permutations, rotations, and boosts in the jet direction. The simplicity of our approach results in a highly flexible and interpretable scheme. We establish the versatility of our method by demonstrating state-of-the-art accuracies in both supervised and unsupervised jet tagging by using several out-of-the-box classifiers with only O(hundreds) of parameters, O(s) training, and O(μs) inference times on CPU.

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