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Enhancing jet taggers with Mass Unspecific Supervised Tagging (MUST)

We introduce a new approach for training jet taggers based on multivariate methods, where the mass and transverse momentum are input variables, along with jet substructure observables, varying over wide ranges. Known as Mass Unspecific Supervised Tagging (MUST), this strategy allows the development of taggers that are sensitive to different types of signal and efficient across large kinematical regions. Additionally, it provides an optimal solution to the mass correlation problem that affects other supervised taggers. We build MUST-inspired generic taggers using neural networks which, when tested with various multi-pronged signals, perform much better than variables commonly used in experiments to discriminate signal from background. These taggers can also spot signals not used in training with a good efficiency. Taggers built upon MUST can be designed to identify the prongness of a jet, which could be extremely useful in a scenario where a new physics signal is discovered.

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