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Model agnostic optimisation of weakly supervised anomaly detection

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Weakly supervised anomaly detection has been shown to find new physics with a high significance at low injected signal cross sections. If the right features and a robust classifier architecture are chosen, these methods are sensitive to a very broad class of signal models. However, choosing the right features and classification architecture in a model-agnostic way is a difficult task as the underlying signal versus background classification task is dominated by noise. In this work, we systematically study a number of optimisation metrics to understand which are most robust in realistic, noisy conditions. Our findings provide practical guidance for improving the stability and performance of weakly supervised anomaly detection, making it a more reliable tool for model-independent new physics searches.

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