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Cluster Scanning

Monday 30 October 2023 18:35 (20 minutes)

We propose a new model independent method of new physics searches called cluster scanning (CS). It utilises k-means algorithm to perform clustering in the space of low-level event or jet observables, and separates potentially anomalous clusters to construct the anomaly rich region from the rest that form the anomaly poor region. The spectra of the invariant mass in these two regions are then used to determine whether a resonant signal is present. We apply this approach in a pseudo-analysis using the LHC Olympics R&D dataset and demonstrate the performance gains over the methods based on the global n-parameter function fits commonly used in bump hunting. Emphasis is put on the speed and simplicity of the method.

Brainstorming idea [abstract]

Discuss how to use latent spaces of unsupervised and SSL models e.g. VAE or CLR to perform clustering or identification of anomalous and non-anomalous jets/event in HEP.

Brainstorming idea [title]

Unsupervised and SSL latent spaces for clustering and anomaly detection

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