

Machine Learning Techniques in the CMS Higgs to Di-muons Search

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With the accumulation of large datasets at energy of 13 TeV, the LHC experiments can search for rare processes, where the extraction of the signal from the copious and varying Standard Model backgrounds poses increasing challenges. Techniques based on machine learning promise to achieve optimal search sensitivity and signal-to-background ratios for such searches. Taking the search for the Higgs boson decay to two muons in the CMS experiment as an example, we highlight several techniques for event classification and introduce a new application for creating automatic event categories, ultimately used to achieve the highest sensitivity of the analysis. We conclude with insights about strategies for optimal utilization of machine learning algorithms with the data expected to be accumulated during Run2 of the LHC.

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