

Machine Learning Techniques for Triggering and Event Classification in Collider Experiments

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Machine learning techniques have already started to take place in the offline analysis of the data obtained with the collider detectors. The implementation is usually in the form of supervised learning where the machine learning algorithms are trained for certain classification or regression tasks and then utilized on the actual data.

With recent developments on the hardware that are capable of unsupervised and reinforcement learning to some extent and the increased variety of complex software algorithms, online triggering and event classification could also be made possible. In lepton collider experiments, which basically record every single event, such techniques can be used for online event classification. In hadron collider experiments on the other hand, such systems can be utilized to trigger “out of expectation events” in addition to trigger for “target category of events” .

Here, we will discuss possible implementations of machine learning techniques for future collider experiments and demonstrate the implementation of powerful software tools.

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