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Nanosecond machine learning with BDT for high energy physics

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We present a novel implementation of classification using boosted decision trees (BDT) on field programmable gate arrays (FPGA). The firmware implementation of binary classification requiring 100 training trees with a maximum depth of 4 using four input variables gives a latency value of about 10ns. Two problems are presented, in the separation of electrons vs. photons and in the selection of vector boson fusion-produced Higgs bosons vs. the rejection of the multijet processes. Implementations such as these enable the level-1 trigger systems to be more sensitive to new physics at high energy experiments. The work is described in [2104.03408].

Summary

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Session Classification: Tools I