

Mixture Density Networks for tracking in dense environments on ATLAS

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The high collision energy and luminosity of the LHC allow to study jets and hadronically-decaying tau leptons at extreme energies with the ATLAS detector. These signatures lead to topologies with charged particles with an angular separation smaller than the size of the ATLAS Inner Detector sensitive elements and consequently to a reduced track reconstruction efficiency. In order to regain part of the track reconstruction efficiency loss, a neural network (NN) based approach was adopted in the ATLAS pixel detector in 2011 for estimating particle hit multiplicity, hit positions and associated uncertainties. Currently used algorithms and their performance in ATLAS will be summarized in the talk. An alternative algorithm based on Mixture Density Network (MDN) is currently being studied and the initial performance is promising. An overview of MDN algorithm and its performance will be highlighted in the talk. Comparisons will also be made with the currently used NNs in ATLAS tracking.

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