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CATCH AND PROLONG: RECURRENT NEURAL NETWORK FOR SEEKING TRACK-CANDIDATES

One of the most important problems of data processing in high energy and nuclear physics is the event reconstruction. Its main part is the track reconstruction procedure which consists in looking for all tracks that elementary particles leave when they pass through a detector among a huge number of points, so-called hits, produced when flying particles fire detector coordinate planes. Furthermore, the tracking is seriously impeded by the famous shortcoming of multiwired, strip and GEM detectors due to appearance in them a lot of fake hits caused by extra spurious crossings of fired strips. Since the number of those fakes is orders of magnitude greater than for true hits one faces with the quite serious difficulty to unravel possible track-candidates via true hits ignoring fakes.

We introduce a renewed method that is a significant improvement of our previous two stages approach based on hit preprocessing using directed K-d tree search followed by applying a deep neural classifier. We combine these two stages in one recurrent neural network that simultaneously determines whether a set of points belongs to a true track or not and predicts where to look for the next point of track on the next co-ordinate plane of the detector. We show that proposed deep network is more accurate, faster and does not require any special preprocessing stage. Preliminary results of our approach for simulated events of the BM@N GEM detector are presented.

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