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Conclusions from TrackML the HEP Tracking Machine Learning challenge

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The HL-LHC will see ATLAS and CMS see proton bunch collisions reaching track multiplicity up to 10.000 charged tracks per event. Algorithms need to be developed to harness the increased combinatorial complexity. To engage the Computer Science community to contribute new ideas, we have organized a Tracking Machine Learning challenge (TrackML). Participants are provided events with 100k 3D points, and are asked to group the points into tracks; they are also given a 100GB training dataset including the ground truth. The challenge is run in two phases. The first "Accuracy" phase has run on Kaggle platform from May to August 2018; algorithms were judged judged only on a score related to the fraction of correctly assigned hits. The second "Throughput" phase ran Sep 2018 to March 2019 on Codalab, required code submission; algorithms were then ranked by combining accuracy and speed. The first phase has seen 653 participants, with top performers with innovative approaches (see arXiv:1904.06778). The second phase has recently finished and featured some astonishingly fast solutions. The talk will report on the lessons from the TrackML challenge and perspectives

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