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Using Evolutionary Algorithms to Optimize Parameters for Track Reconstruction PETER CHATAIN, ROCKY GARG, LAUREN TOMPKINS, Stanford Univ — In high energy experiments, reconstructing charged particle trajectories is one of the most CPU intensive tasks. A Common Tracking Software (ACTS) is a collaborative project to generate track reconstruction tools that are agnostic to specific detector geometries. Track seeding is the first stage of track reconstruction which produces short track candidates for further refinement. Currently, the seeding algorithm in ACTS relies on many hand tuned, detector specific cuts inherited from the ATLAS experiment and configurable parameters that are not optimal for other geometries. In this paper, we investigate the application of machine learning methods to optimize the seed finding algorithm parameters for multiple detector geometries. We find that an evolutionary algorithm performed best on both the generic detector in ACTS and the Light Dark Matter Experiment (LDMX) tagging tracker, with efficiencies of 99.4% and 97.89% respectively. We find that evolutionary algorithms are a powerful tool for parameter optimization. respectively.

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