

## Evolutionary Algorithms for Tracking Algorithm Parameter Optimization

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The reconstruction of charged particle trajectories, known as tracking, is one of the most complex and CPU consuming parts of event processing in high energy particle physics experiments. The most widely used and best performing tracking algorithms require significant geometry-specific tuning of the algorithm parameters to achieve best results. In this paper, we demonstrate the usage of machine learning techniques, particularly evolutionary algorithms, to find high performing configurations for the first step of tracking, called track seeding. We use a track seeding algorithm from the software framework A Common Tracking Software (ACTS). ACTS aims to provide an experiment- independent and framework-independent tracking software designed for modern computing architectures. We show that our optimization algorithms find highly performing configurations in ACTS without hand-tuning. These techniques can be applied to other reconstruction tasks, improving performance and reducing the need for laborious hand-tuning of parameters.

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