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## Genetic Programming and its application to HEP

*Thursday, 30 September 2004 18:10 (20 minutes)*

Genetic programming is a machine learning technique, popularized by Koza in 1992, in which computer programs which solve user-posed problems are automatically discovered. Populations of programs are evaluated for their fitness of solving a particular problem. New populations of ever increasing fitness are generated by mimicking the biological processes underlying evolution. These processes are principally genetic recombination, mutation, and survival of the fittest.

Genetic programming has potential advantages over other machine learning techniques such as neural networks and genetic algorithms in that the form of the solution is not specified in advance and the program can grow as large as necessary to adequately solve the posed problem.

This talk will give an overview and demonstration of the genetic programming technique and show a successful application in high energy physics: the automatic construction of an event filter for FOCUS which is more powerful than the experiment's usual methods of event selection. We have applied this method to the study of doubly Cabibbo suppressed decays of charmed hadrons ( $D^+$ ,  $D_s^+$ , and  $\Lambda_c^+$ ).

**Primary author:** VAANDERING, E. (VANDERBILT UNIVERSITY)

**Presenter:** VAANDERING, E. (VANDERBILT UNIVERSITY)

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