

# Genetic Algorithms and Programming

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# Opening Discussion

- Minute essay comment:
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- I continue to thank Wikipedia for help with this lecture.

# GA Algorithm

- Initialize
- Evaluate fitness
- Repeat the following until termination
  - Select best-fit individuals
  - Breed selected individuals
  - Evaluate fitness of offspring
  - Replace least-fit with new individuals
- Consider 0,1-knapsack problem.
- It is customary to use binary strings and use Gray coding instead of normal binary representation

# Genetic Programming

- This works very much like GA, but with programs that are typically represented as trees.
- Crossover is done by swapping branches of trees.
- Mutation can change branches or leaf values.
- You must either take care to only generate valid programs or to be fail-safe.

# Evolutionary Simulation

- What if your goal is simulation of an evolutionary system?
- Many of the approaches of GA should probably work. However, you want to pick details to match what you are simulating, not to give fast convergence on optimized solution.
- You still need a way of encoding genetic information and a fitness function to evaluate quality of an individual.

# Jiva-NG

- <http://code.google.com/p/jiva-ng/>
- This is a GA library written for Scala.

# Minute Essay

- Questions?
- We'll finish up Evolutionary stuff next time.