Genetic Algorithms and Programming

3-30-2011
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.
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.
Questions?

We'll finish up Evolutionary stuff next time.