Genetic and Evolutionary Algorithms Come of Age — David E. Goldberg

Kim, Boosung
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- What are genetic algorithms?
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What is genetic algorithms?

- Search procedures based on natural selection
  - Binary strings
  - K-ary trees

```scheme
(IF (AND (OR (n) (ne)) (NOT (e)))
  (east)
  (IF (AND (OR (e) (se)) (NOT (s)))
    (south)
    (IF (AND (OR (s) (sw)) (NOT (w)))
      (west)
      (north)))
)
What is genetic algorithms?

- Simple GA
  - Three operations: selection, crossover, mutation

- Simple but powerful!
What is genetic algorithms?

- Simple GA
  - has infinite variety: hard to design
  - Holland’s notion: schemata and building blocks
Why use GAs in applications?

- Advantages of GAs
  - GAs can solve hard problems with relatively little consideration
  - Not problem specific – easy extension from other GAs or phenomena
  - Can be hybridized with existing methods
Practical uses of GAs

- EnGENEous – CAD system
- FacePrints – faceprint generator
Practical uses of GAs

- [http://www.youtube.com/watch?v=qS5HWBNvf9U&feature=related](http://www.youtube.com/watch?v=qS5HWBNvf9U&feature=related) – human face
- [http://www.youtube.com/watch?v=a0nwQYeTPO&feature=related](http://www.youtube.com/watch?v=a0nwQYeTPO&feature=related) – starcraft
GAs are making changes

- Computer-based problem solving became more powerful

- Many hard-works were solved by GAs

- And GAs can be adapted to many of unsolved problems