Primordial Soup

The building blocks of Genetic Algorithms in 20 minutes

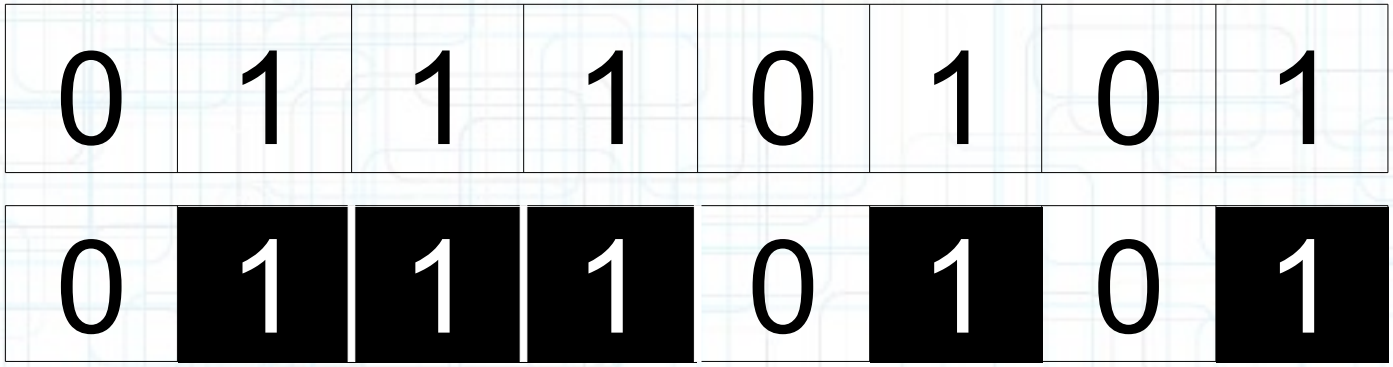
Craig Nicol

Introduction

- Why genetic algorithms?
- Chromosomes
- Populations
- When and where to use them
- Genetic Programming

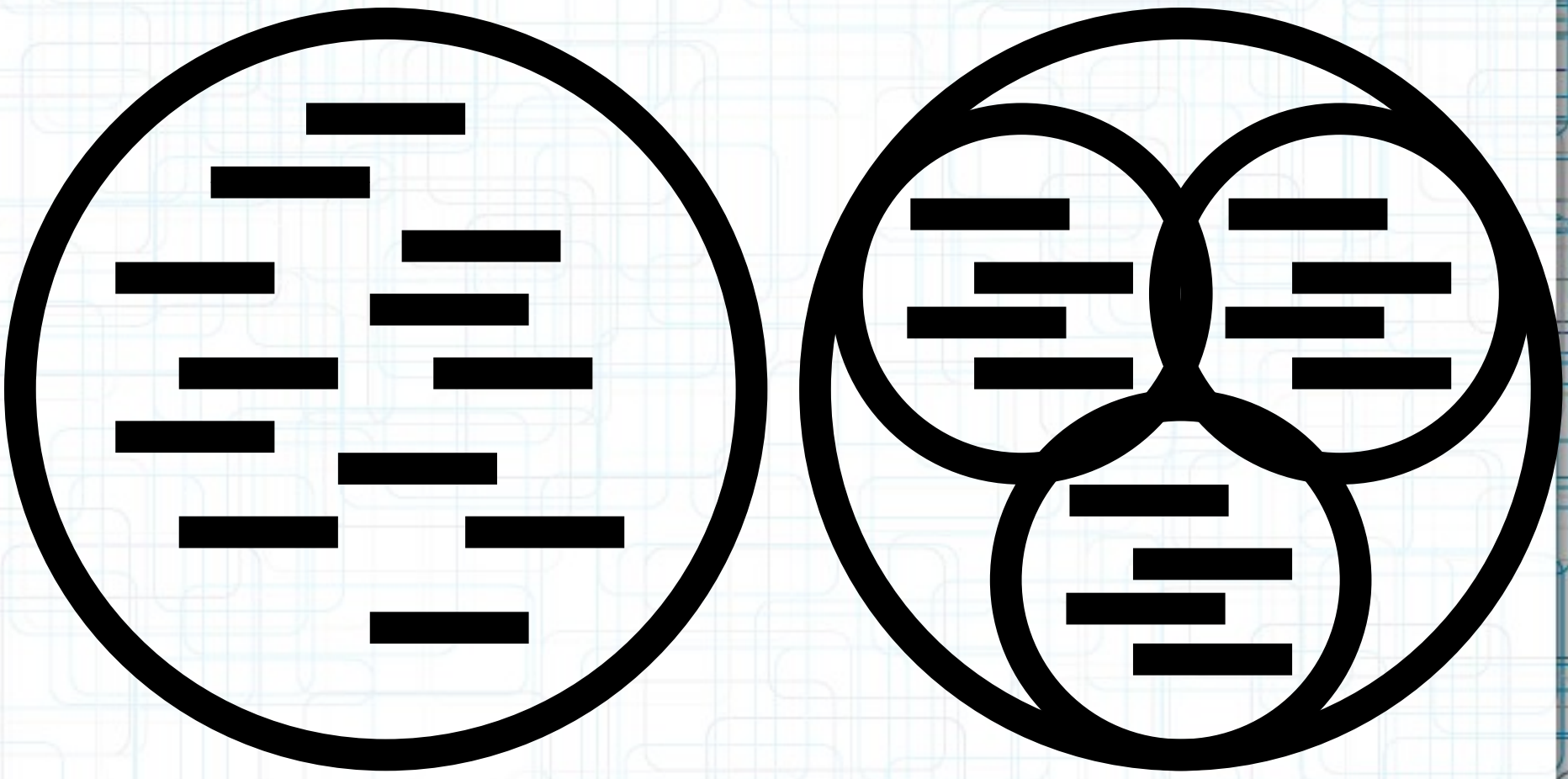
Chromosome

- Looks like:
- Bool, int, Whatever you like



Population

- Single or multiple

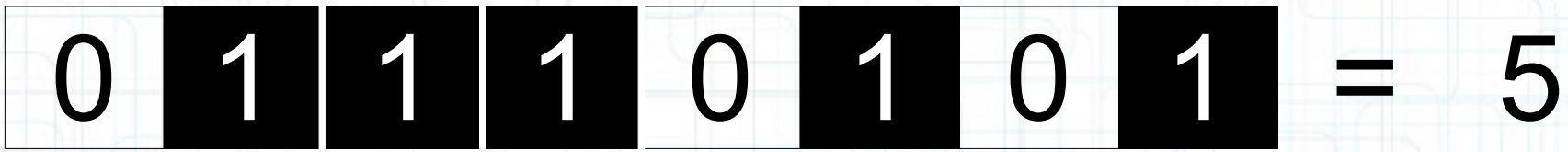


Breeding

- Selection
  - Fitness
  - Selection of Parents
- Crossover
- Mutation
- Migration (for multiple populations)

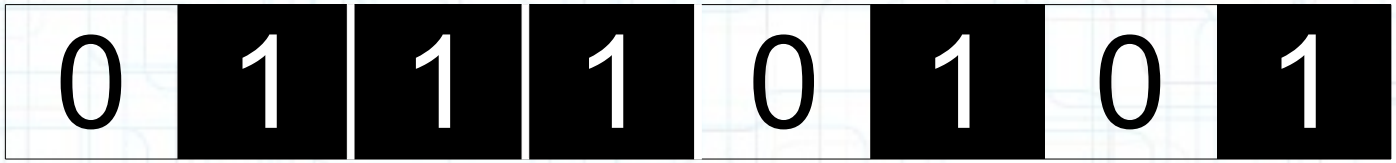
Selection

- Fitness
- Selection method
  - Ranking
  - Stochastic Universal Sampling

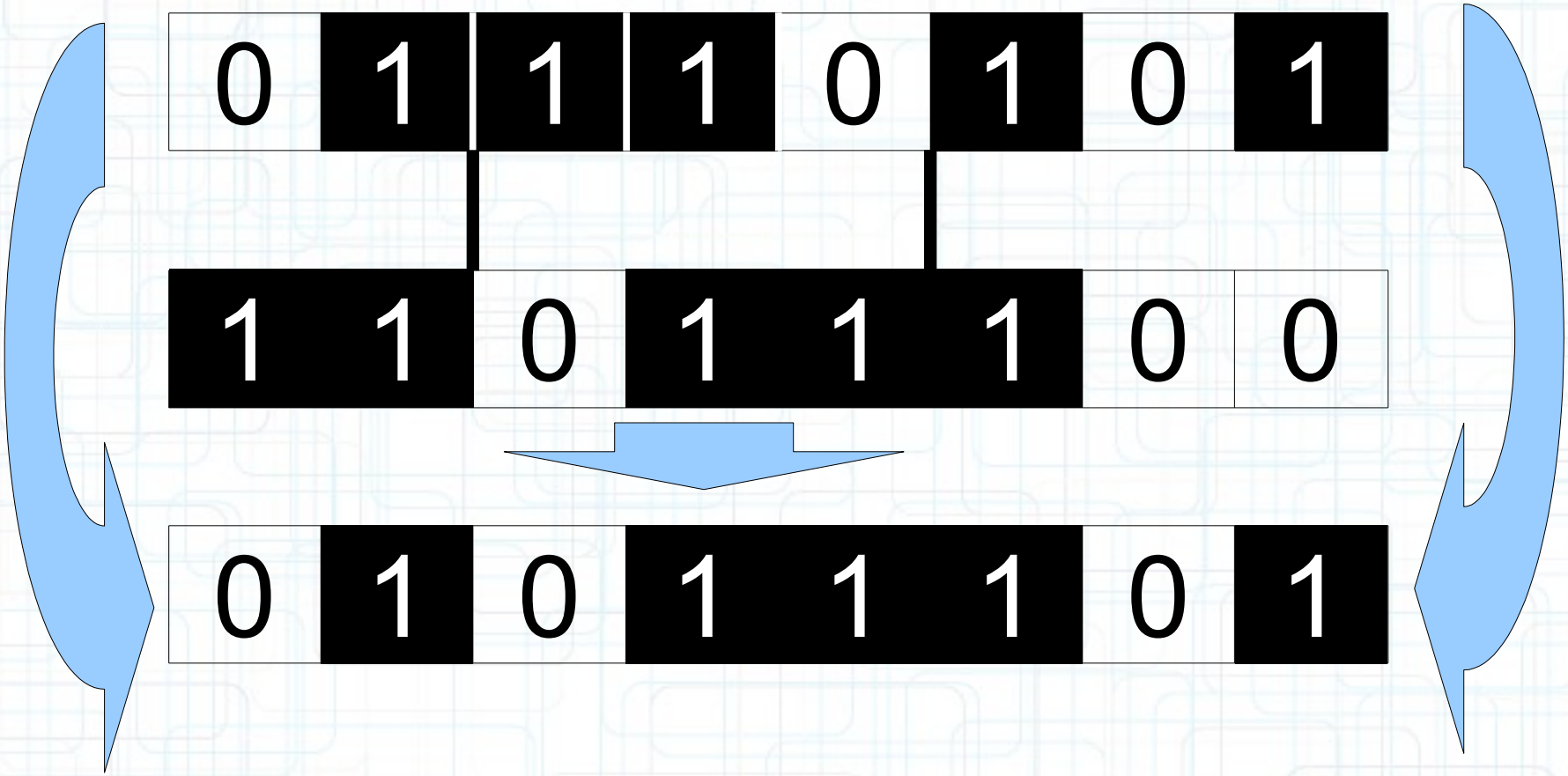


Crossover

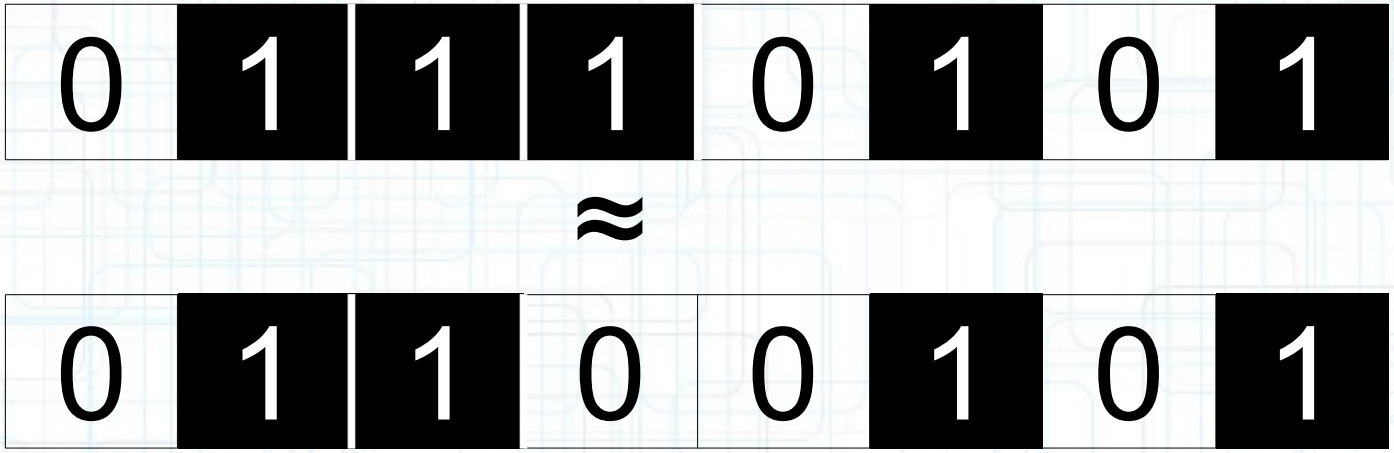
- Single point
- 2-point



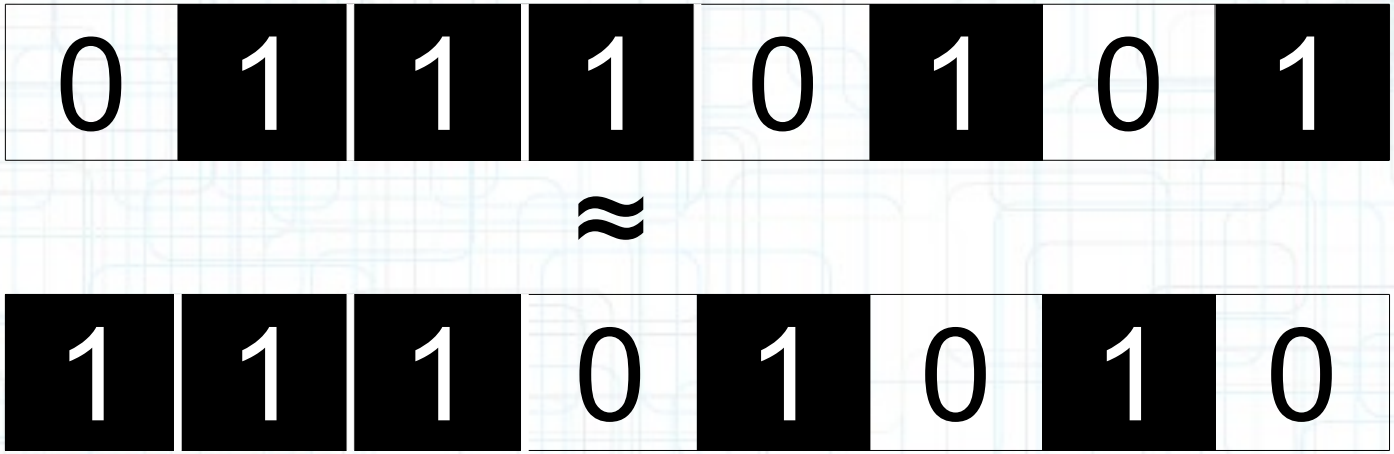
Two-Point Crossover



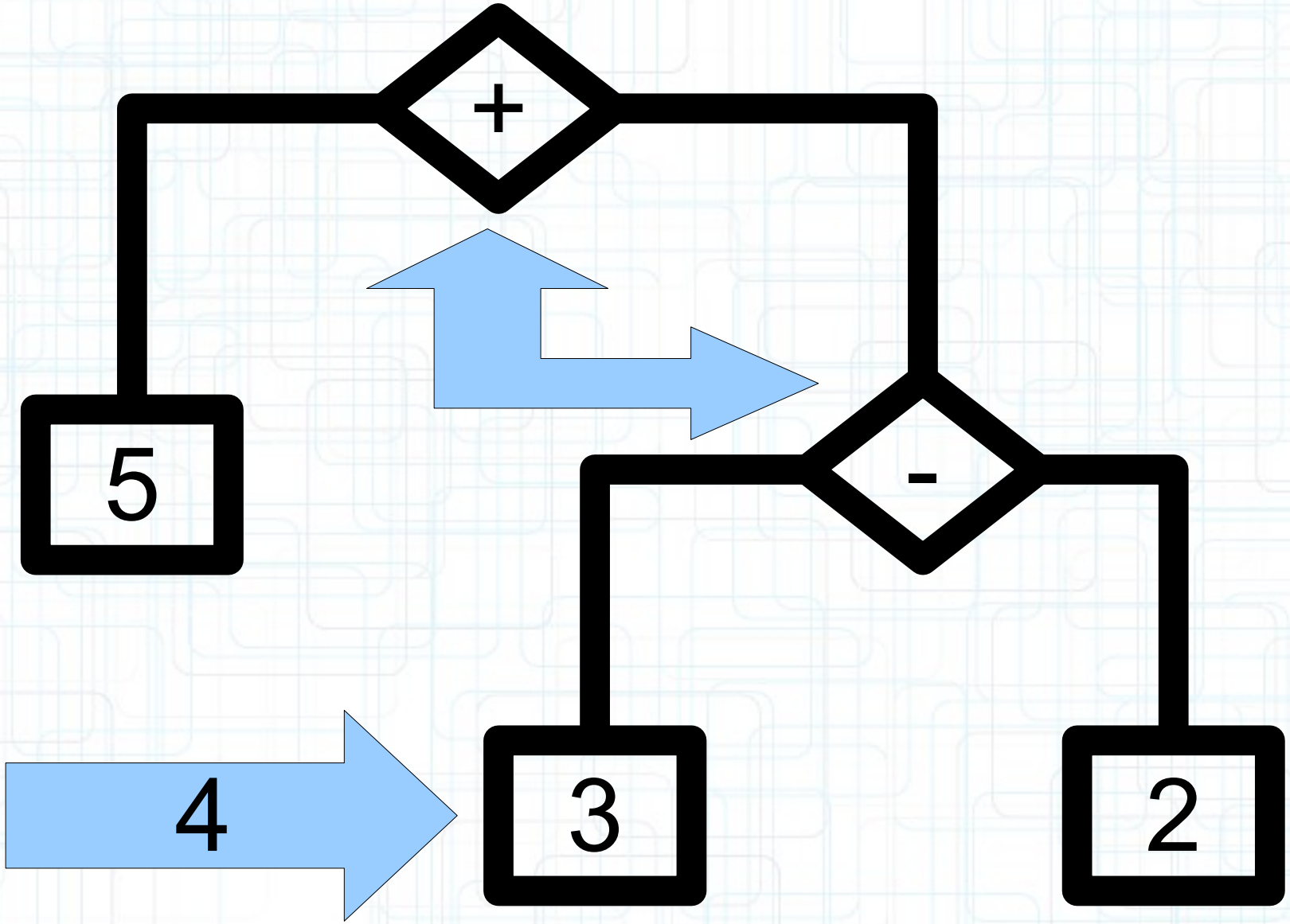
Mutation



Permutation



Genetic Programming



When to use them

- Large search space
- Hard to predict where answer is
- Easy to calculate fitness function

Things to watch

- Randomness & Seeding
- Defining the right chromosomes
- Setting the parameters correctly
  - Mutation Rate
  - Crossover Method
  - Selection Method

Summary

- Short introduction to Genetic Algorithms
- Biological theory
- Pros and cons
  - Large search space
  - Sensitive to how they are set up
- Genetic Programming
- Lots of libraries available, and on-line demos, C++ library on next slide...

Thanks

- http://code.google.com/p/geneticalgorithmtemplates
- http://craignicol.wordpress.com
- http://www.twitter.com/craignicol
- craig.nicol@gmail.com
- Thank you for listening