

# 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

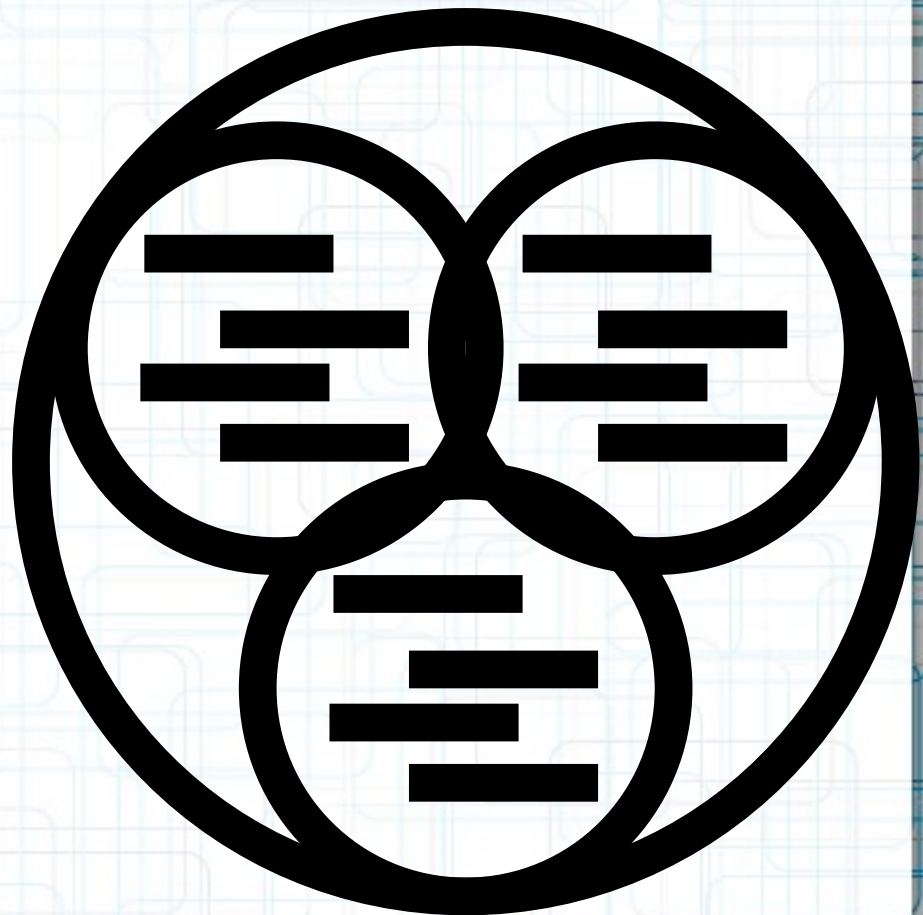
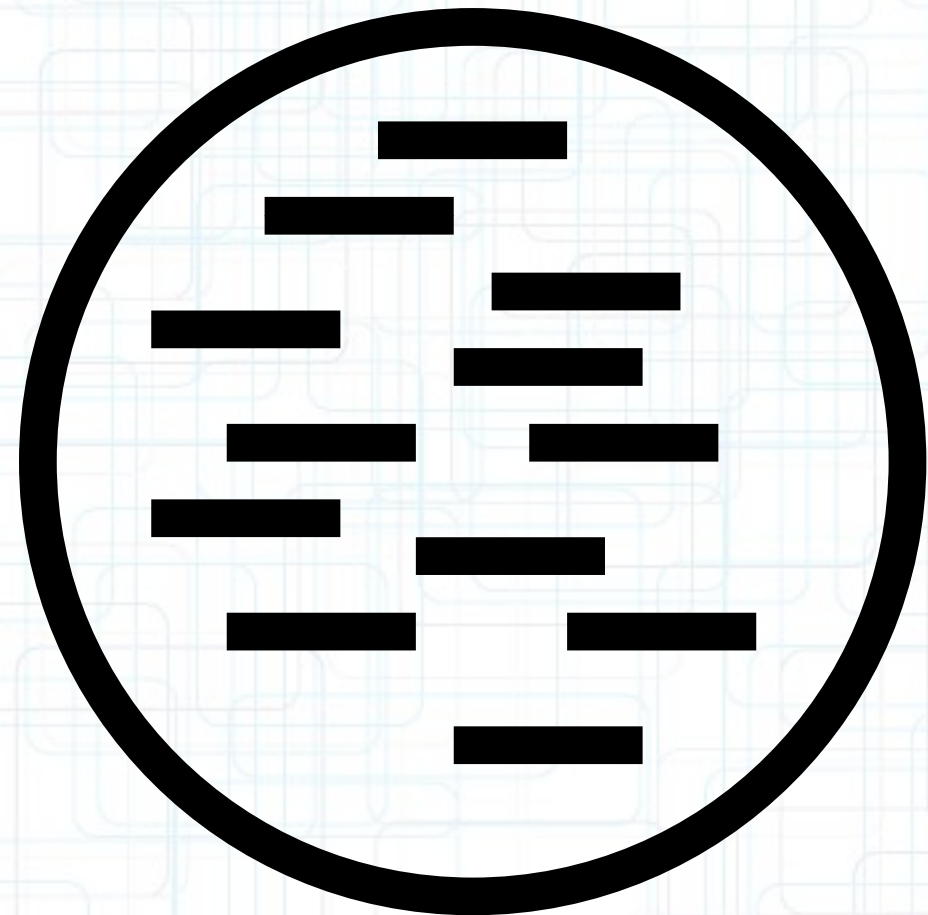
- Looks like:
- Bool, int, Whatever you like

0	1	1	1	0	1	0	1
0	1	1	1	0	1	0	1



# Population

- Single or multiple



# Breeding

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

# Selection

- Fitness
- Selection method
  - Ranking
  - Stochastic Universal Sampling

$$\begin{array}{|c|c|c|c|c|c|c|c|} \hline 0 & 1 & 1 & 1 & 0 & 1 & 0 & 1 \\ \hline \end{array} = 5$$

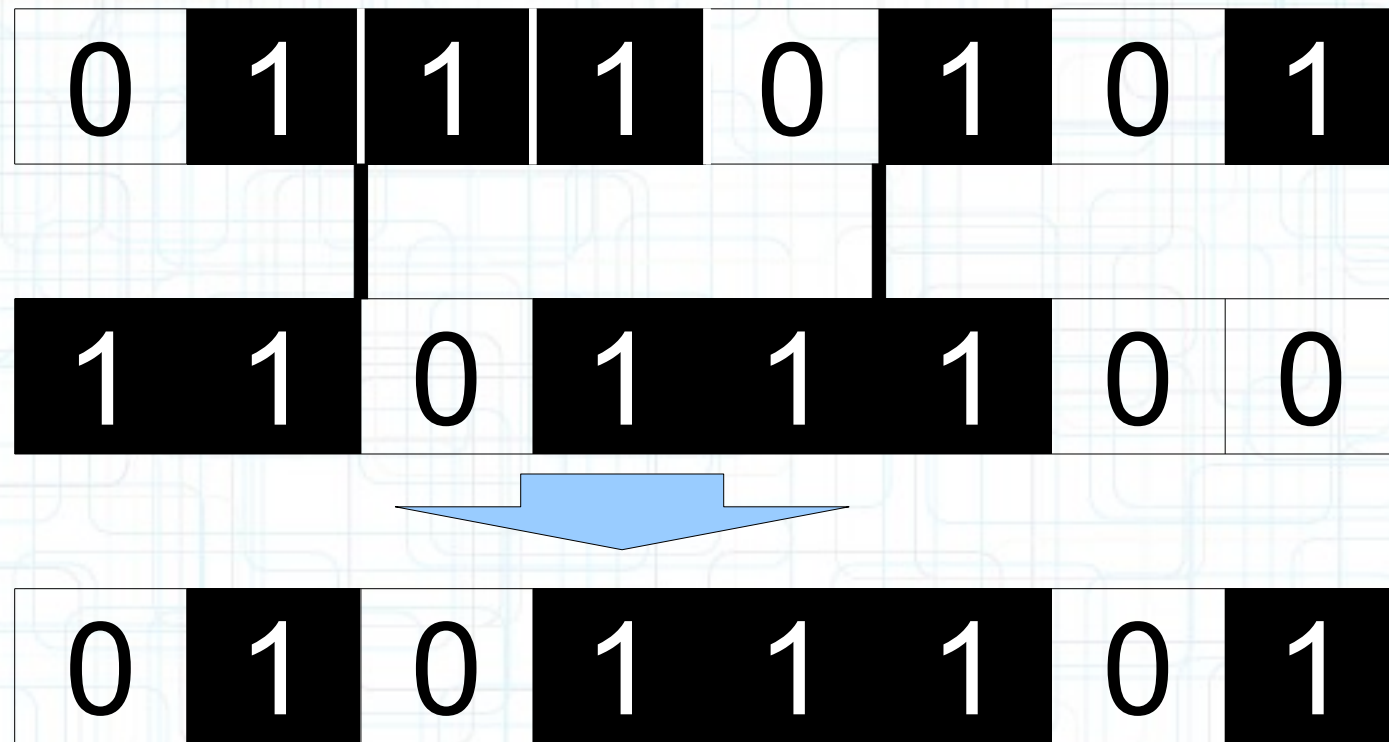


# Crossover

- Single point
- 2-point

0	1	1	1	0	1	0	1
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# Two-Point Crossover





# Mutation

0	1	1	1	0	1	0	1
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$\approx$

0	1	1	0	0	1	0	1
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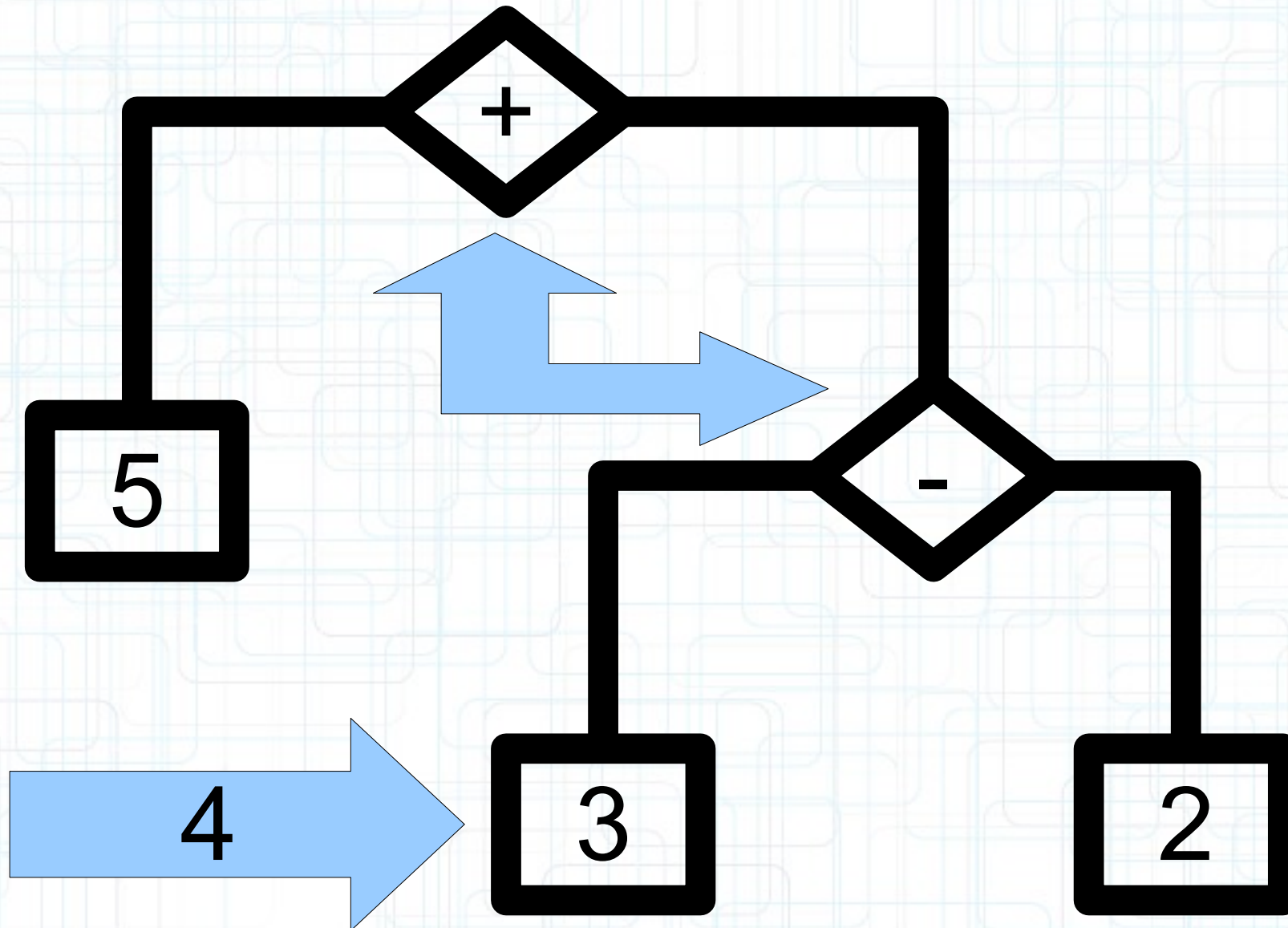
# Permutation

0	1	1	1	0	1	0	1
---	---	---	---	---	---	---	---

$\approx$

1	1	1	0	1	0	1	0
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# 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

# Thanks

- <http://code.google.com/p/geneticalgorithmtemplates>
- <http://craignicol.wordpress.com>
- <http://www.twitter.com/craignicol>
- [craig.nicol@gmail.com](mailto:craig.nicol@gmail.com)
- Thank you for listening