



Genetic Algorithms

mimic natural selection
 $\max f(x,y,z) \leftarrow$ Individuals have genes
 genes determine phenotype (physical characteristics)
 phenotype contributes to fitness
 fitness contributes to propagation

nature-inspired $\left\{ \begin{array}{l} \text{ant colony opt} \\ \text{particle swarm opt} \end{array} \right.$

start with random population — random collection of individuals
 while not done (out of time, no recent improvement) (random genes)
 generation $\left\{ \begin{array}{l} \text{evaluate individuals} \\ \text{select for crossover} \\ \text{crossover} \\ \text{select for survival} \\ \text{mutate} \end{array} \right.$

genes \rightarrow inputs to $f \rightarrow$ evaluate $f \rightarrow$ fitness
 bias towards individuals w/ higher fitness
 randomly select genes from each parent for offspring
 replacement? (offspring replace parents) fitness based? (offspring compete w/ parents)
 randomly change genes for some individuals } exploration

Representation: what is genetic code? some sequence of bits

