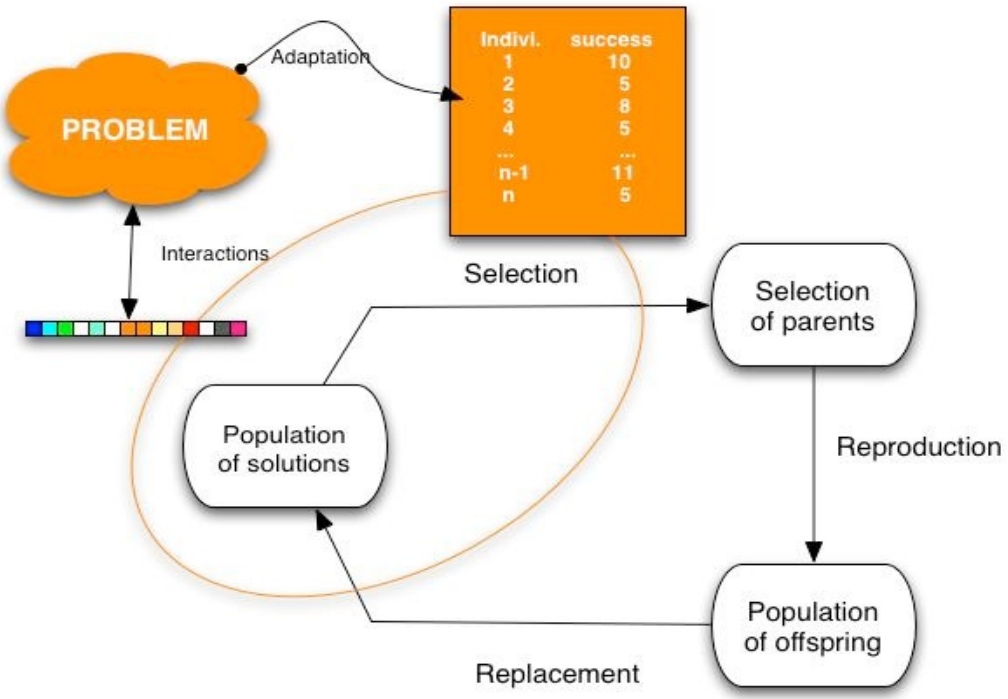
Genetic algorithms

- Variant of local beam search with "*sexual*" *recombination.*



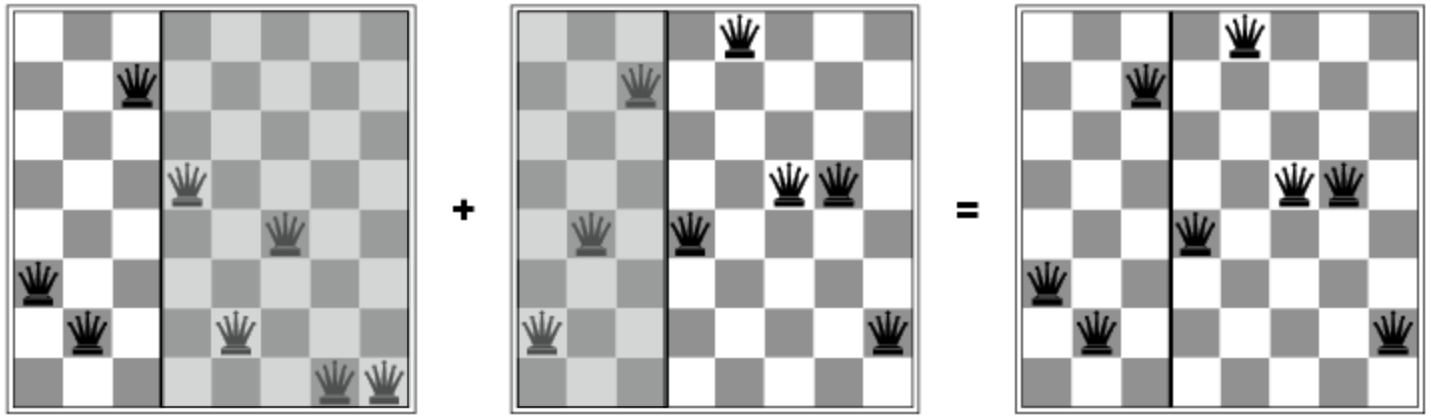
Genetic algorithms (GA)

- A successor state is generated by combining *two* parent states (vs. modifying a single state in local beam search)
- Start with *k* randomly generated states (population)
- Each state, or individual, is represented as a string over a finite alphabet (often a string of 0s and 1s)
- Evaluation function (fitness function in GA terminology)
  - Returns higher values for better states (e.g. # of non-attacking pair of queens)
- Produce the next generation of states by selection, crossover, and mutation

Genetic algorithms

- In this instance:
  - Fitness function: number of non-attacking pairs of queens (min = 0, max = (8 × 7)/2 = 28)
  - Probability of being selected for reproduction is directly proportional to fitness score:
  - 24/(24+23+20+11) = 31%
  - 23/(24+23+20+11) = 29% etc

Genetic algorithms



Reproduction step example