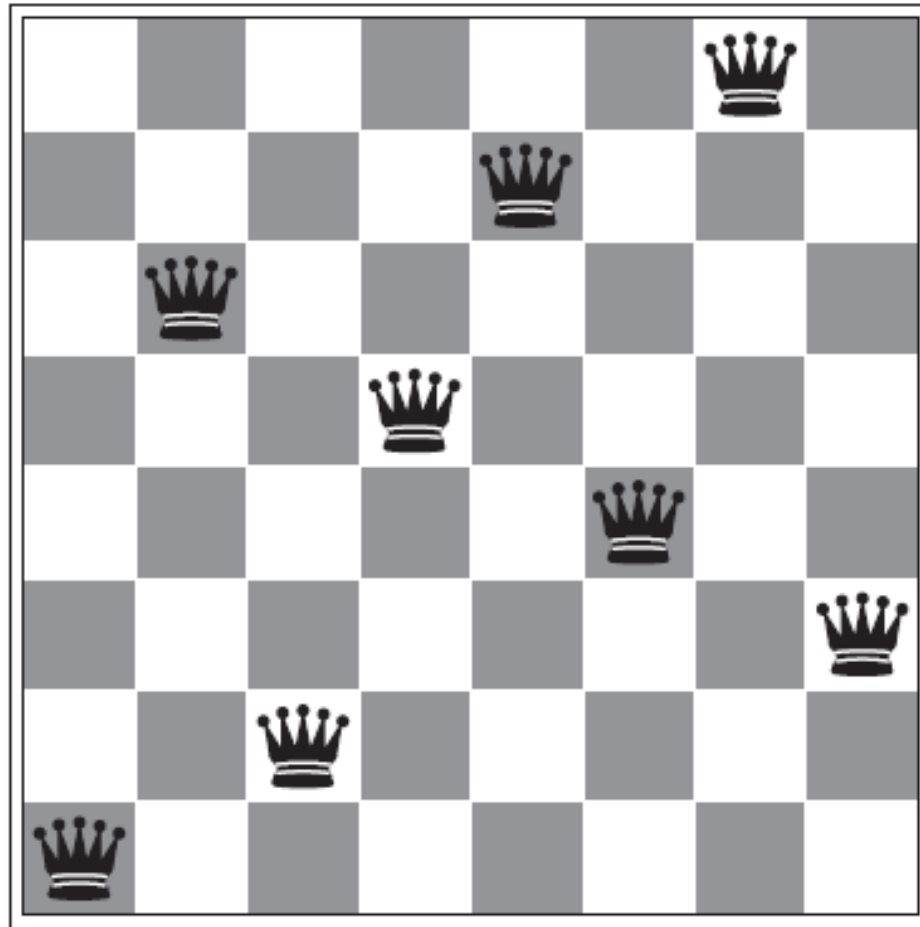# Local Search and CSP

CS161

Guy Van den Broeck

Local Search

- Sometimes the path to the goal is irrelevant
- Only final configuration matters
  - n-queens, circuit design, road network, cryptarthmatic, rubik, sliding tile, TSP?
- Modify a single current node
- Good for optimization problems
  - objective function

Hill-Climbing Search

Hill-Climbing Search

How to locally modify TSP?

Simulated Annealing

- Randomly select candidate successor

- Go there if better

- Else go there with probability
  function of "energy" and "temperature"

Genetic Algorithms
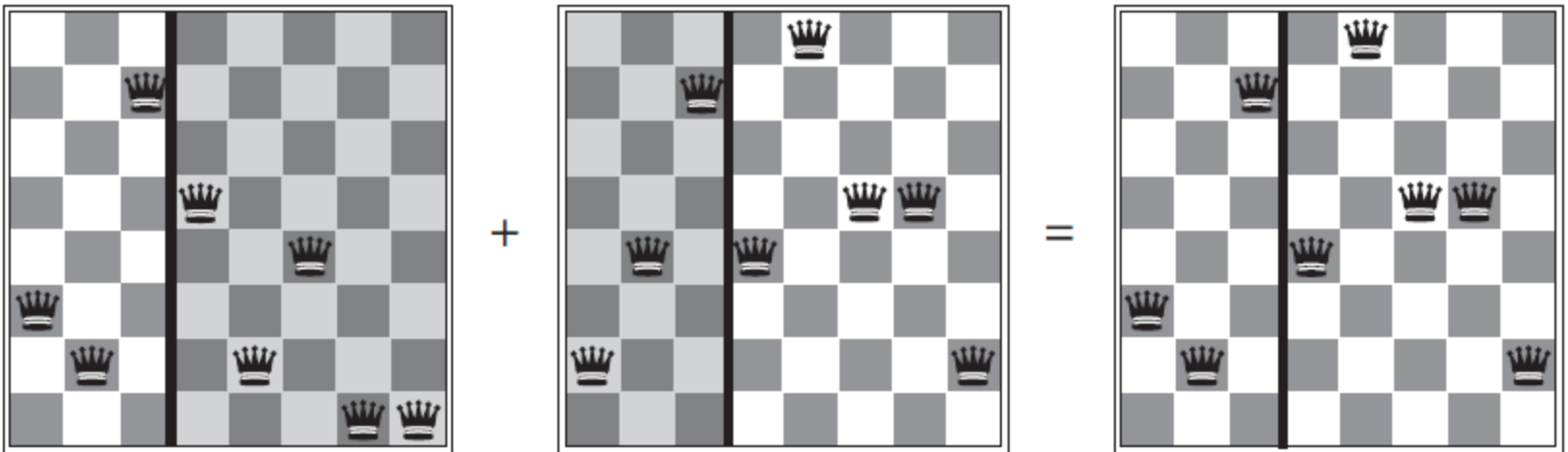
24748552

32752411

24415124

32543213

(a)

Initial Population

24748552	24 31%	32752411
32752411	23 29%	24748552
24415124	20 26%	32752411
32543213	11 14%	24415124

(a)   (b)   (c)

Initial Population   Fitness Function   Selection

24748552	24 31%	32752411	32748552
32752411	23 29%	24748552	24752411
24415124	20 26%	32752411	32752124
32543213	11 14%	24415124	24415411

(a)   (b)   (c)   (d)

Initial Population   **Fitness Function**   **Selection**   **Crossover**

(a)	(b)	(c)	(d)	(e)
Initial Population	Fitness Function	Selection	Crossover	Mutation