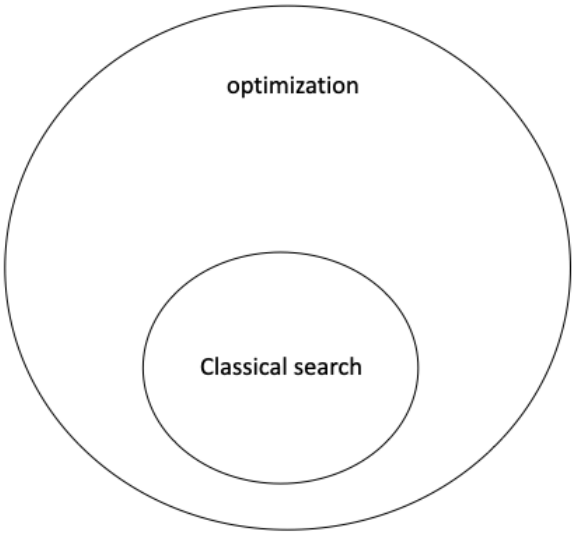
CAS CS 440
Lec 4

Local Search I

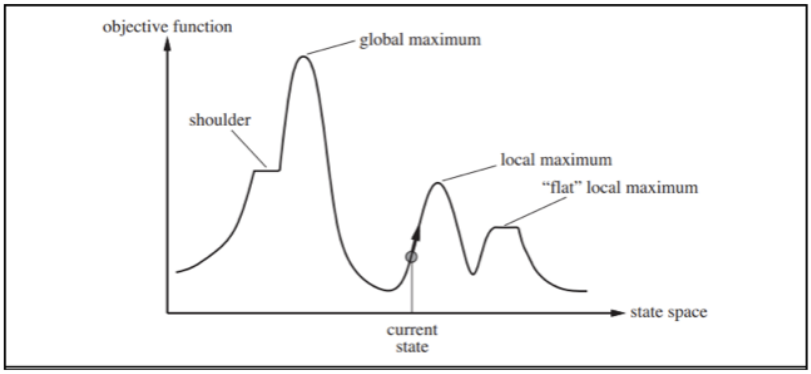
1. Problems with Classical Search
    a. Blind search + Informed Search are nice:
        i. optimality (most algorithms)
        ii. Finds solution to problem
            1. Path to the goal (from the start)
    b. What happens if we don't care about the path?
    c. Not appropriate for large-scale worlds
    d. Does not model some real-world problems
2. Optimization
    a. Find the best state according to an objective function:

$$s^* = \underset{s \in W}{\operatorname{argmin}} f(s^*) \; OR \; s^* = \underset{s \in W}{\operatorname{argmax}} f(s^*)$$

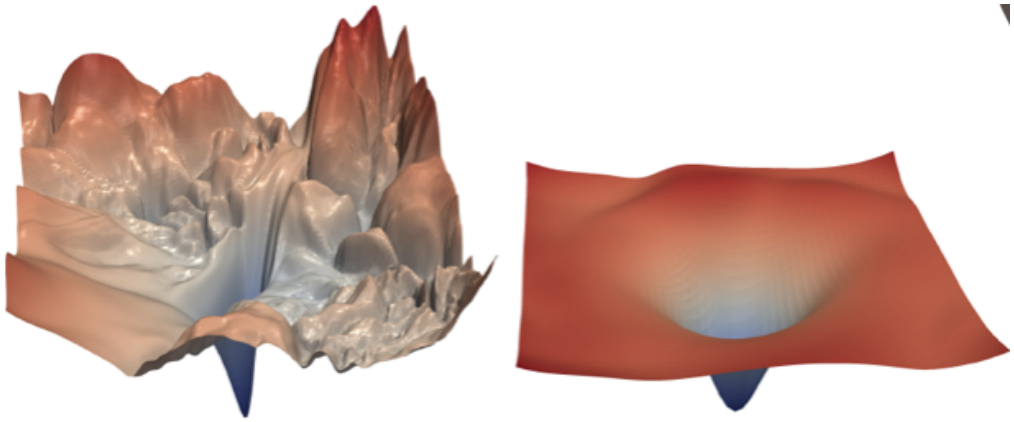
    b. Can always convert a min max
    c. Classical Search is optimization (for paths):
        i. Path cost is objective function
        ii. Find the path (from source to dest) with min cost
3. Optimization and Classical Search
    a.



4. How to Optimize 101
    a. Geometric angle
        i. For every state, use objective to get value of state (“objective value”)
            1. Draw the curve!
        ii. Algorithms “move” along the surface of the curve
            1. If min problem, find the lowest point on the curve
            2. If max problem, find the highest point!



b.



(a) without skip connections (b) with skip connections

c.