**1/19/18**

**Hill Climbing problem**: how to climb a hill without seeing the hill (climb based on steepness)

* Alg where you always go up and never backtrack: greedy algorithm
  + may end up going to local max instead of global max

**Simulated Annealing**

* Allows for chance to escape from local optima
  + optima = lowest potential energy
* S.A is based on an analogy to a metallurgical process called annealing
  + minimize energy not maximize height
    - so it is stable at the end
* Energy Function: E: S →ℜ+ that assigns to each state a non negative real number
* State space is often a cartesian product of many subspaces which correspond to a state variable.

**06-Advanced-Search-Algorithms-II**

* employ probabilistic state changes to help escape from local minima + maxima
* combine strengths from various candidate solution

**Motivation**

* Use nature as a guide (mutation, darwin natural selection, and reproduction
* take advantage of parallel processing
* use randomness to escape from local maxima of the fitness function.

**Most Fit Model (Evolutionary Model)**

* Goal: product individual with certain characteristics
* Method: create diverse population, create a way to add and to remove. let pop evolve
* mutation: random small changes to genetic bp
* cross over: splice together piece from individ. A and B for a new individual.
* fitness function: a way to stop pop from exploding (map individual to scalar fitness value)
  + tells how fit the individual is

**Mutation:** Makes a move or perhaps a sequence of moves in the State Space

* if direction is random, good chance to escape from local maxima
* Type 1: A random modification of one atomic unit -- one gene.
* Type 2: A reordering of genes, .e.g, a transposition of two genes.

**CrossOver:** Formation of a genetic blueprint for a new individual by splicing together a piece from individual A with a piece from individual B.

* If A and B are fit, then maybe new individual will be even more fit.