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CS355 – Beyond Search

# Beyond Search Homework

## 1. Simulated Annealing with T=0 and omitting termination test

```
function SimulatedAnnealing(problem) returns solution state:

    current = node with problem initial state

    for t = 1 to infinity do:
        next = random successor for current
        Delta E = next.Value – current.Value
        if ΔE > 0 then current = next
        else current = next
```

## 2. Genetic Algorithm with population of 1

```
population = set with population size 1
function GeneticAlgorithm(population) returns individual:
    new_population =  empty set
    for i = 1 to SIZE(population) do:
        x = SELECT-ONE(population)
        if (small random probability) then x = MUTATE(x)

    population = x

return x
```

## 3. Hill Climbing with random restarts

```
function RandomRestartHillClimbing(problem) returns state of the best maximum:

    start = CHOSE-RANDOM(problem) // randomly chosen starting node
    best_run = current highest value state

    loop do:
        local_maximum = HillClimbing(start)
        if local_maximum.VALUE > best_run.VALUE
        then best_run = local_maximum

    until sufficient time has passed or a goal value is reached

    return best_run

function HillClimbing(problem) returns a state that is a local maximum:

    current = MAKE-NODE(problem.INITIALSTATE)
    loop do:
        neighbor = highest value successor of current
        if neighbor.VALUE <= current.VALUE then return current.STATE
        current = neighbor
```