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Module 5 Self Check

General

1. successors(5) = [4, 6]
2. find-best-child(3) = [4]

Hill Climbing

1. 7→8→9
   Starting from state 7, we use find-best-child(7) = [8]. Then we evaluate find-best-child(8)=[9]. Running find-best-child(9) = [10], we see that f(9) > f(10), and the local maxima has been reached. In this example, 9 is also the global maximum.
2. 2→3→4
   Starting from state 2, we use find-best-child(2) = [3]. Then we evaluate find-best-child(3)=[4]. Running find-best-child(4) = [5], we see that f(4) > f(5), and the local maxima has been reached. However, f(4) is not the global maximum.
3. We can only guarantee a global maximum when we evaluate the function at every state.

Beam Search

1. Beam search would follow this below path:
   a. 2 7
   b. 3 8
   c. 4 9
   d. 4 9

   In this instance, the local maxima are identified in the same step, and the algorithm would return [9] because f(9) > f(4)

Simulated Annealing

1. In a simulated annealing, there's a possibility of the state transitioning from 4→5→6→7, depending on the temperature/deltaE and random chance. We've shown previously that a hill climbing search from state 7 will lead to the global maxima of [9]

Crossover

1. Crossover at gene location 8
   a. `tyx cat kn ihe hit` `hqex wt in tbvjxat`
   b. `hqex wt kn ihe hit` `tyx cat in tbvjxat`
2. Crossover at gene location 12
   a. `tyx cat kn ihe hit` `hqex wt in tbvjxat`
   b. `hqex wt in ihe hit` `tyx cat kn tbvjxat`
3. Crossover at gene location 0
   a. `tyx cat kn ihe hit` `hqex wt in tbvjxat`
   b. `tyx cat kn ihe hit` `hqex wt in tbvjxat`

Mutation

1. Mutation at location 9 and symbol index 13
    a. hqaz at if tbvjopt
    b. hqaz at in tbvjopt
2. Mutation at location 2 and symbol index 0
    a. hqaz at if tbvjopt
    b. hqaz at if tbvjopt