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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.

1. 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.

1. 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:
   1. 2 7
   2. 3 8
   3. 4 9
   4. 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
   1. tyx cat kn ihe hit hqex wt in tbvjxat
   2. hqex wt kn ihe hit tyx cat in tbvjxat
2. Crossover at gene location 12
   1. tyx cat kn ihe hit hqex wt in tbvjxat
   2. hqex wt in ihe hit tyx cat kn tbvjxat
3. Crossover at gene location 0
   1. tyx cat kn ihe hit hqex wt in tbvjxat
   2. tyx cat kn ihe hit hqex wt in tbvjxat

Mutation

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