Artificial Intelligence Assignment Report

Written + Programming Assignment

Various alpha and beta values were chosen for the same graph and the following was noted after 500 iterations , with no of cities = 6 and no of ants = 4:

Distance Matrix = [[0, 13, 15, 1, 9, 15],
[13, 0, 15, 7, 20, 9],
[15, 15, 0, 7, 1, 17],
[1, 7, 7, 0, 11, 9],
[9, 20, 1, 11, 0, 13],
[15, 9, 17, 9, 13, 0]]

Alpha = 0.5
=> cost of best path = 65
Beta = 1.2

Alpha = 2
=> cost of best path = 51
Beta = 0.4

Alpha = 1
=> cost of best path = 37
Beta = 4

Alpha = 1
=> cost of best path = 31
Beta = 1

With no of ants = 6

Alpha = 0.5
=> cost of best path = 54
Beta = 1.2

Alpha = 2

=> cost of best path = 58

Beta = 0.4

Alpha = 1

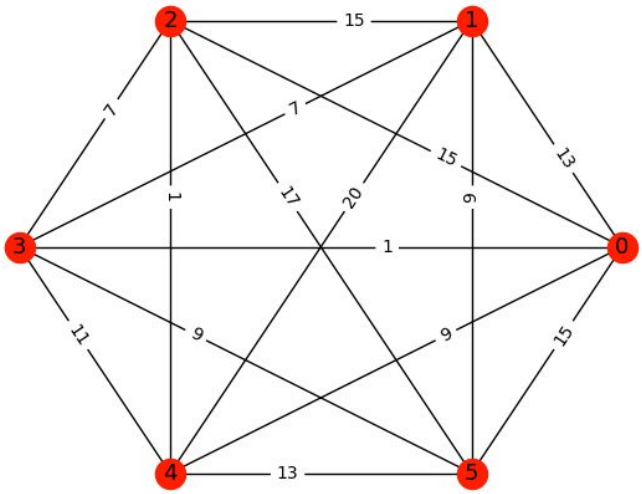
=> cost of best path = 33

Beta = 4

Alpha = 1

=> cost of best path = 37

Beta = 1



Distance Matrix = [[0, 1, 2, 11, 8, 20],
[1, 0, 1, 13, 20, 12],
[2, 1, 0, 17, 8, 1],
[11, 13, 17, 0, 12, 13],

[8, 20, 8, 12, 0, 19],
[20, 12, 1, 13, 19, 0]]

Alpha = 0.5

=> cost of best path = 28

Beta = 1.2

Alpha = 2

=> cost of best path = 53

Beta = 0.4

Alpha = 1

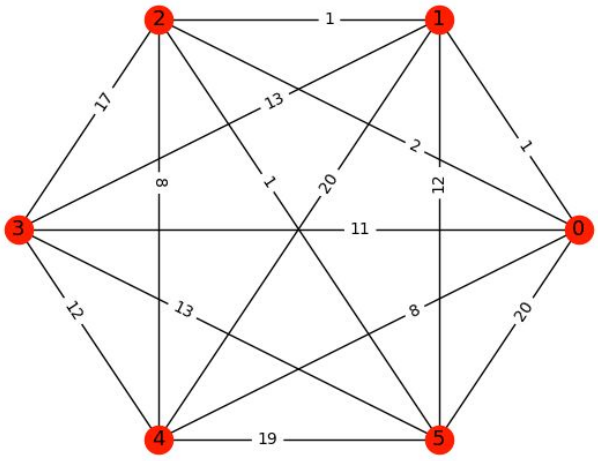
=> cost of best path = 43

Beta = 4

Alpha = 1

=> cost of best path = 38

Beta = 1



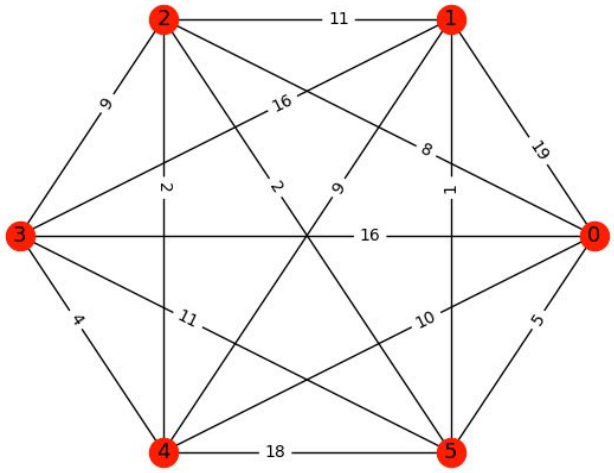
Distance Matrix = [[0, 19, 8, 16, 10, 5],
[19, 0, 11, 16, 9, 1],
[8, 11, 0, 9, 2, 2],
[16, 16, 9, 0, 4, 11],
[10, 9, 2, 4, 0, 18],
[5, 1, 2, 11, 18, 0]]

Alpha = 0.5
Beta = 1.2
=> cost of best path = 35

Alpha = 2
Beta = 0.4
=> cost of best path = 25

Alpha = 1
Beta = 4
=> cost of best path = 29

Alpha = 1
Beta = 1
=> cost of best path = 34



When alpha is at a higher value, more preference is given to the pheromone levels while calculating the probability for choosing a particular edge between two cities. When beta is higher, shorter distances are given higher priority.

Hence, whenever alpha > beta, the final path chosen depends highly on what path was initially chosen by the ants, when there was no pheromone.
Whenever, alpha < beta, the final path chosen by the ants depends on the distances between two nodes.

Since the algorithm is highly probabilistic in nature, the cost of the path chosen by the ants in all the 4 cases oscillates, i.e., in some cases, the cost is low, while in others, it is high.