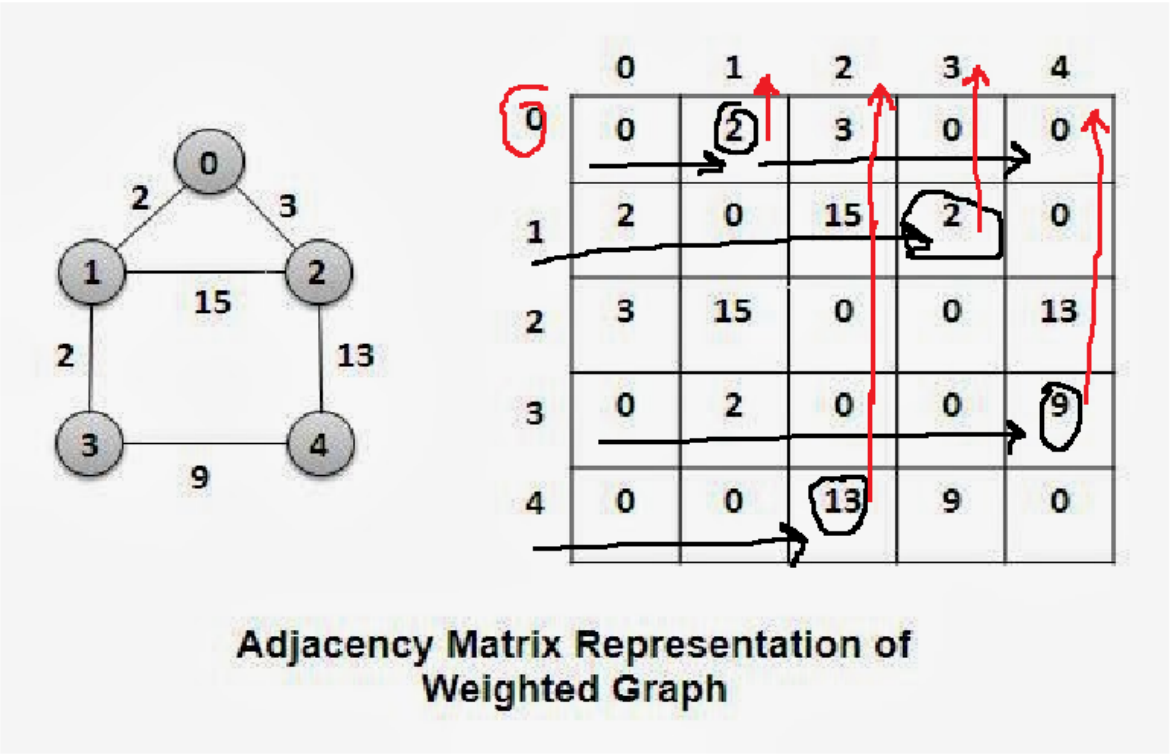
CS22M087 SUSMIT JAISWAL CS22M015 ANMOL PAL GROUP 55

ARTIFICIAL INTELLIGENCE
Assignment 1 (Traveling Salesman Problem)

1 Method : Nearest Neighbor
In the nearest neighbor algorithm we tried to run from all the nodes In one iteration we found the nearest neighbor and then from that nearest neighbor we again run one iteration to find its nearest neighbor in that way we found a cycle that was a tsp cycle we maintain a visited array so that a single note can never visited again. Maintained a counter which tell whether number of nodes are counted till its totals
Picture reference : https://www.cs.mtsu.edu/~xyang/3080/adjacencyMatrix.html

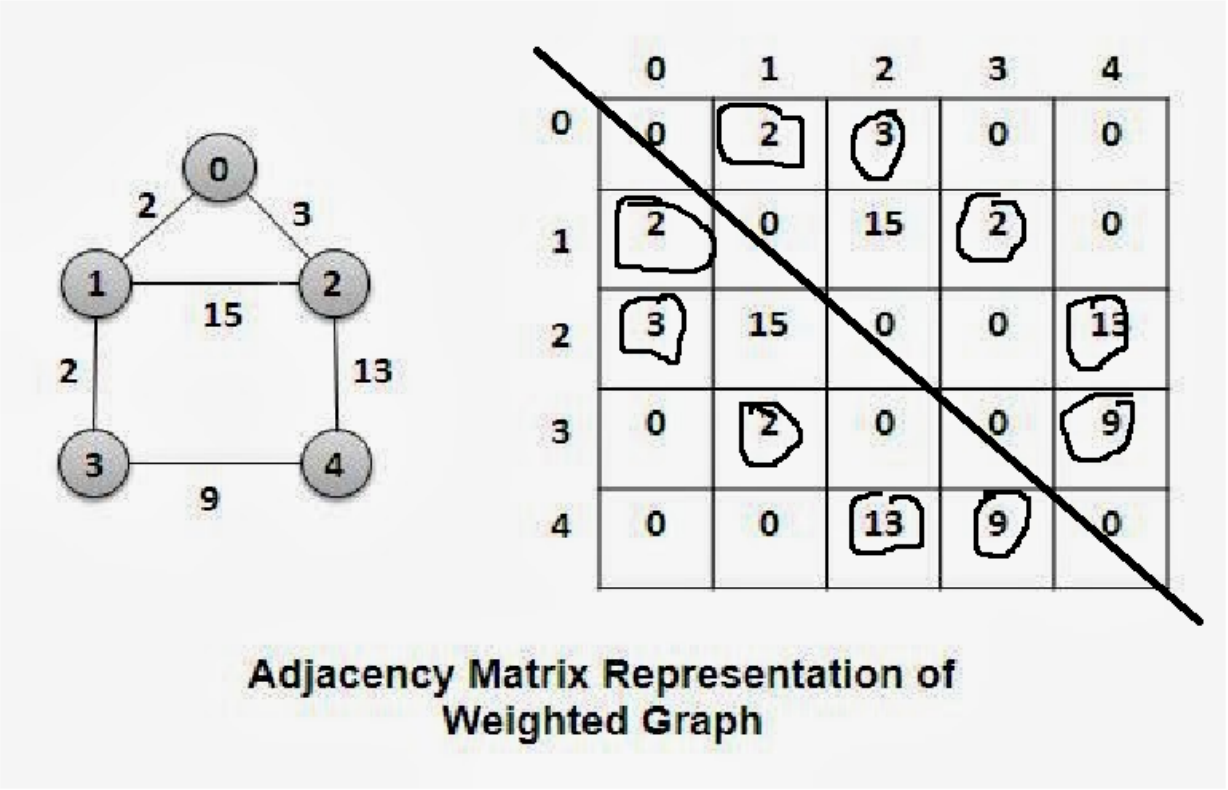
0 -> 1 ->3 ->4 ->2



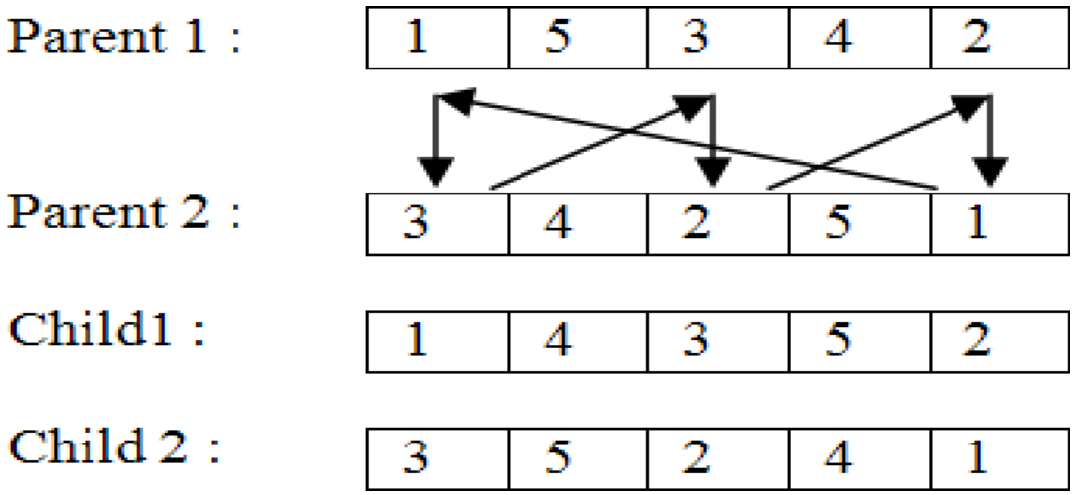
Adjacency Matrix Representation of Weighted Graph

2 Method Greedy Method (Kruskal)
In the greedy approach we modified the Kruskal algorithm by picking the minimum weighted edges and then we avoided the cycle and maintain a modified visited array which doesn't allow a note to pick if it is connected to nodes in that way it became a cycle in which a note can we connected by only two nodes.Till the visited array become all 2 we runned the algorithm.
Picture reference : https://www.cs.mtsu.edu/~xyang/3080/adjacencyMatrix.html

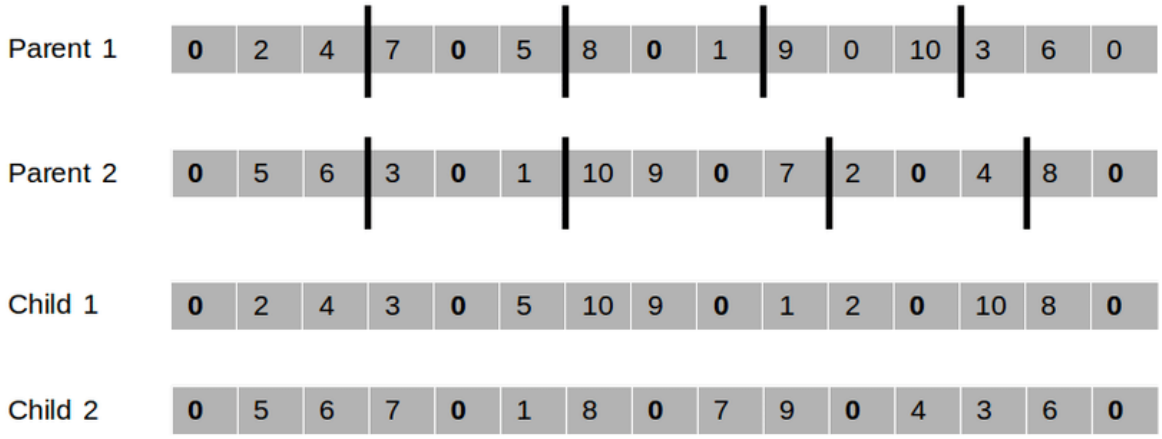
picked (0 <--> 1) , (0<-->2),(1<-->2),(3<-->4),(2<-->4)



3 Cyclic Crossover:(10 generation and 2 city exchange)
Took the odd cycles form parent one and even cycle in child 2 and vice versa.
Picture reference :
https://www.semanticscholar.org/paper/Solving-Timetable-Problem-by-Genetic-Algorithm-and-Lukas-Aribowo/8b174c841b7b24b1a51a23ec26da1f8fbed782d7/figure/3



4 Ordered Crossover
Picture reference :
https://www.researchgate.net/figure/Ordered-crossover-operator_fig3_334777236



Results : Given are the results on running the algorithm over provided test cases of 50 nodes and 100 nodes in the assignment.

EUC : Euclidean, NON-EUC nonEuclidean

	50 nodes EUC	50 nodes NON-EUC	100 nodes EUC	100 nodes NON EUC
Nearest neighbor	1252.31	2723.21	1835.04	5324.19
Greedy Kruskal	1444.59	2777.8	1917.9	5307.33
Cyclic crossover	4037.34	4166.98	8450.39	9068.37
Ordered Crossover	4163.79	4179.65	8617.55	9074.53

Conclusion : Found out that greedy and nearest neighbor works well while randomized choice genetic algorithm works not as per expectations with 2 city exchange.