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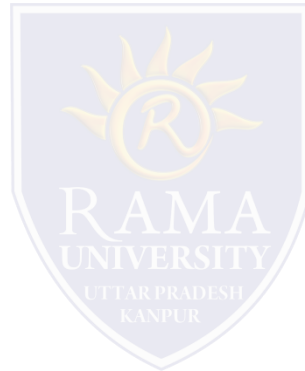
Soft Computing

LECTURE -34

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OUTLINE

- **Traveling Salesman Problem using Genetic Algorithm**

- **Approach**

- **Algorithm of TSP**

- **Steps of TSP using GA**

- **Multiple Choice Question**

- **References**

Traveling Salesman Problem Using Genetic Algorithm

Genetic algorithms are heuristic search algorithms inspired by the process that supports the evolution of life. The algorithm is designed to replicate the natural selection process to carry generation, i.e. survival of the fittest of beings. Standard genetic algorithms are divided into five phases which are:

1. Creating initial population.

2. Calculating fitness.

3. Selecting the best genes.

4. Crossing over.

5. Mutating to introduce variations.
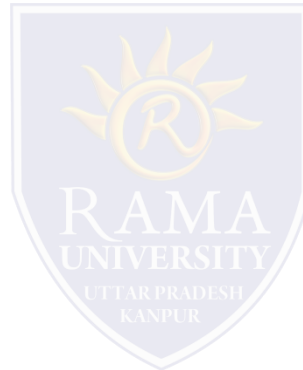
Traveling Salesman Problem Using Genetic Algorithm

Approach:

In the following implementation, cities are taken as genes, string generated using these characters is called a chromosome, while a fitness score which is equal to the path length of all the cities mentioned, is used to target a population.

Fitness Score is defined as the length of the path described by the gene. Lesser the path length fitter is the gene. The fittest of all the genes in the gene pool survive the population test and move to the next iteration. The number of iterations depends upon the value of a cooling variable. The value of the cooling variable keeps on decreasing with each iteration and reaches a threshold after a certain number of iterations.
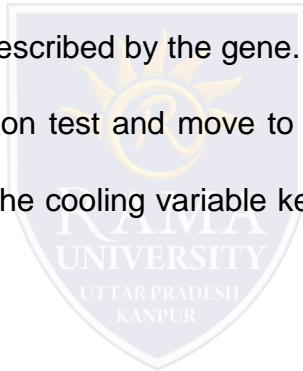
Steps of TSP using GA

1. Initialize the population randomly.

2. Determine the fitness of the chromosome.

3. Until done repeat:

    1. Select parents.

    2. Perform crossover and mutation.

    3. Calculate the fitness of the new population.

4. Append it to the gene pool.

MULTIPLE CHOICE QUESTION

1. Which of the following is false in the case of a spanning tree of a graph G?

a) It is tree that spans G

b) It is a subgraph of the G

c) It includes every vertex of the G

d) It can be either cyclic or acyclic

2. Every graph has only one minimum spanning tree.

a) True

b) False

3. Consider a complete graph G with 4 vertices. The graph G has _____ spanning trees.
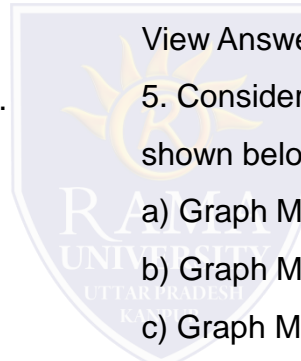
a) 15

b) 8

c) 16

d) 13

4. The travelling salesman problem can be solved using _____

a) A spanning tree

b) A minimum spanning tree

c) Bellman – Ford algorithm

d) DFS traversal

View Answer

5. Consider the graph M with 3 vertices. Its adjacency matrix is shown below. Which of the following is true?

a) Graph M has no minimum spanning tree

b) Graph M has a unique minimum spanning trees of cost 2

c) Graph M has 3 distinct minimum spanning trees, each of cost 2

d) Graph M has 3 spanning trees of different costs

REFERENCES

❑https://www.javatpoint.com/artificial-neural-network-hopfield-network

❑https://www.geeksforgeeks.org/traveling-salesman-problem-using-genetic-algorithm/