



# The Travelling Salesman Problem And Its Solution Using Genetic Algorithm

IT-203 Discrete Mathematics Project

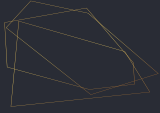
By :-

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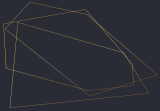
Pranav Surendran





## Problem Statement :-

Finding a solution for the Travelling Salesman Problem using Genetic Algorithm and checking its efficiency and error rate.



## Objectives :-

- Understanding the Travelling salesman problem.
- Coming up with an algorithm to find a solution for it.
- Fine tuning the algorithm to make it more efficient and easy to implement.
- Creating a program to show the solution pictorially.

# TIMELINE

## WEEK 1-3

Going through different papers and finalising the topic

## WEEK 6-7

Going through the different solutions already present.

## WEEK 9

Creating a program to help visualise the problem and solution

## WEEK 3-5

Researching further on the paper chosen and its details

## WEEK 7-8

Learning about the genetic algorithms and its applications

# Methodology Used

1. Randomly create the initial population of individual string of the given TSP problem and create a matrix representation of the cost of the path between two cities.
2. Assign the fitness to each chromosome in the population using fitness criteria measure.  $F(x) = 1/x$  where,  $x$  represents the total cost of the string. The selection criteria depend upon the value of string if it is close to some threshold value.
3. Create new offspring population from two existing chromosomes in the parent population by applying crossover operator.
4. Mutate the resultant off-springs if required. NOTE: After the crossover offspring population has the fitness value higher than the parents.
5. Repeat step 3 and 4 until we get an optimal solution to the problem.

# Individual Contributions

Stafan: worked js program execution, improving the genetic algorithm

Pranav: Analysed other solutions to the traveling salesman problem, helped work on the main algorithm

Shivam: Worked on report and ppt, Worked on the genetic algorithm.

# Conclusion

Our solution to the traveling salesman problem using genetic algorithm finds us good solutions in less time, compared to the brute force approach. However the nature of the solution depends upon the implementation of both the crossover function and mutation functions. With some analysis we have seen that the particular implementations that we have used leads to optimal results.

Genetic algorithms have contributed to some of the best known traveling salesman problem solutions till date. With our future work, in particular the analysis of our survivor selector, we can aim to produce further improvements.

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**Thank You : )**