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| **SCTR's PUNE INSTITUTE OF COMPUTER TECHNOLOGY, PUNE - 411043** |
| **Department of Computer Engineering**  **S.No.-27, Pune Satara Road, Dhankawadi, Pune-411043** |

Laboratory Practice-III (AY 2021-22)

Batch - P2 Sem - 8

Date – 28/04/2022

**ML MINI PROJECT 1**

**TEAM MEMBERS:** Aniket Rathod - 41204, bhavik Patalia - 41211, Naad Borole – 41215

**TEACHER:** PROF. SHWETA SHAH

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**TITLE:**

**Apply the Genetic Algorithm for optimization on a dataset obtained from UCI ML Repository. For Example: IRIS Dataset or Travelling Salesman Problem or KDD Dataset**

**1. INTRODUCTION**

**1.1. MOTIVATION**

Genetic Algorithm is one of the most popular optimization algorithms. It can be used for a wide number of problems starting from NP-Hard problems to Reinforcement Learning problems. While the optimal solution is not guaranteed with GA, a near optimal solution is achieved almost every time. Optimal solutions may also be obtained.

**1.2. OBJECTIVE**

The objective of the project is to understand the genetic algorithm and apply it to classical problems that do not have a polynomial time solution. The problem chosen for the mini project is the travelling salesman problem.

**1.3. SCOPE OF PROJECT**

Travelling salesman problem is a classical NP-Hard problem. There have been several approaches in the past to solve the problem. Genetic algorithm is one of the optimization techniques that can be applied to the problem. It can generate a near optimal solution for the problem. The scope of the algorithm can be extended to more complicated problems such as reinforcement learning etc.

**1.4. INTENDED AUDIENCE**

The targeted audience of the project would be research scientists who work on finding optimal solutions to problems that cannot be solved in polynomial time.

**2. OVERALL DESCRIPTION**

**2.1. FUNCTION REQUIREMENTS**

The system only consists of one functional requirement. It expects the initial population as the input and the output would be different generations of the individuals.

**2.2. NON-FUNCTIONAL REQUIREMENTS**

The non-functional requirements of the system would be to ensure that the system has sufficient processing power to run the algorithm for thousands of generations.

**2.3. OPERATING ENVIRONMENT**

The algorithm was run on the following environment:

1. Intel i5 7th Generation

2. 16 GB RAM

3. Windows 10 Home

**3. FLOWCHART**

Diagram

Description automatically generated

**4. IMPLEMENTATION AND SCREENSHOTS**

Implementation was done using Python with the help of NumPy for computations.

Text

Description automatically generated

**5. CONCLUSION**

Thus, we were able to solve the travelling salesman problem using genetic algorithm.

**6. REFERENCES**

1. <https://www.geeksforgeeks.org/traveling-salesman-problem-using-genetic-algorithm/>

2. Hussain, Abid, et al. "Genetic algorithm for traveling salesman problem with modified cycle crossover operator." Computational intelligence and neuroscience 2017 (2017).