**Sample File**

The input files used for the experiments are inst-19.tsp, inst20.tsp and inst-7.tsp from the TSP dataset. All the execution was done in PyCharm. Any execution of the code follows the below command format.

python TSP\_R00182510.py [input\_file] [population size] [mutation rate] [number of Iterations]

The configurations that were implemented and evaluated are given below. Each experiment involves a set of the below configurations.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Configuration** | **Initial Solution** | **Selection** | **Crossover** | **Mutation** |
| 1 | Random | Random Selection | Uniform Crossover | Inversion mutation |
| 2 | Random | Random Selection | PMX Crossover | Reciprocal Exchange |
| 3 | Random | Stochastic Universal Sampling | Uniform Crossover | Reciprocal Exchange |
| 4 | Random | Stochastic Universal Sampling | PMX Crossover | Reciprocal Exchange |
| 5 | Random | Stochastic Universal Sampling | PMX Crossover | Inversion mutation |
| 6 | Random | Stochastic Universal Sampling | Uniform Crossover | Inversion mutation |
| 7 | Heuristic | Stochastic Universal Sampling | PMX Crossover | Reciprocal Exchange |
| 8 | Heuristic | Stochastic Universal Sampling | Uniform Crossover | Inversion mutation |

The experiments conducted in the code environment follows the below order of execution and execution commands. In total, 12 different experiments (12 runs of the program) were conducted.

**Basic Evaluation**

This is to run configurations 1 and 2 for the given input files.

This should be done by commenting out the code for instances from configuration 3 to configuration 8 (Comment lines 469 to 503).

To run Configurations 1 and 2 -> uncomment the code between the tags <BASIC>

-> comment out the code between tags <EXTENSIVE>

For running inst-19.tsp, provide the following command.

python TSP\_R00182510.py inst-19.tsp 100 0.1 500

For running inst-20.tsp, provide the following command

python TSP\_R00182510.py inst-20.tsp 100 0.1 500

For running inst-7.tsp, provide the following command

python TSP\_R00182510.py inst-7.tsp 100 0.1 500

**Extensive Evaluation**

This is to run configurations 3 to 8. These configurations should run together for each experiment to reproduce similar results as stated in the report.

The execution of the configurations (3 to 8) was done by commenting out the configuration instances 1 and 2 (Comment lines 454 to 454).

To run configurations 3 to 8 -> uncomment the code between tags <EXTENSIVE>

-> comment out the code between tags <BASIC>

There are three different experiments for each file, based on the input provided in the command.

For inst-19.tsp file, provide the following command.

Population size = 100, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-19.tsp 100 0.1 500

Population size = 300, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-19.tsp 300 0.1 500

Population size = 300, Mutation rate = 0.5, No. of Iterations = 500

python TSP\_R00182510.py inst-19.tsp 100 0.5 500

For inst-20.tsp file, provide the following command.

Population size = 100, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-20.tsp 100 0.1 500

Population size = 300, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-20.tsp 300 0.1 500

Population size = 300, Mutation rate = 0.5, No. of Iterations = 500

python TSP\_R00182510.py inst-20.tsp 100 0.5 500

For inst-7.tsp file, provide the following command.

Population size = 100, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-7.tsp 100 0.1 500

Population size = 300, Mutation rate = 0.1, No. of Iterations = 500

python TSP\_R00182510.py inst-7.tsp 300 0.1 500

Population size = 300, Mutation rate = 0.5, No. of Iterations = 500

python TSP\_R00182510.py inst-7.tsp 100 0.5 500

**Important Notes before execution**

The time of execution of the files follow the below order from smaller to larger.

Inst-19.tsp < inst-20.tsp < inst-7.tsp

Since the configurations 3 to 8 are always run together, it would take more time to complete.

The impact of Elite survival was not implemented in the code.