**README**

List of files submitted:

1. **SD\_R00183334.py**: This file is the main python file which the user needs to execute. It contains a main class named ‘BasicTSP’ and there are multiple class variables and methods for initialization of population, different chromosome selection algorithm functions, different crossover and mutation functions. Other than this there are different utility functions like calculating Euclidean distance function, update mating pool, update best fitness chromosome, etc.
2. **Individual.py**: This file is basically used to generate population based on the number of cities provided. It has a main class “Individual” whose constructor is used to generate TSP paths(chromosomes) based on the type of population generation choice passed; for e.g. heuristic (nearest neighbour approach) or random method. Other than that, there are multiple class methods available which are used to calculate the fitness, set best fitness, make a copy of chromosome, get fitness of a particular chromosome and calculate the euclidean distance between 2 selected chromosomes(TSP paths).
3. **utils.py**: This file contains some important utility functions to get TSP population path using nearest neighbour approach (provided Prof. Diarmuid Grimes). Other functions are to get transformed fitness.
4. **Configs.json**: This file is used to run the Genetic algorithm for different configurations. These configurations are based on what is asked in the assignment 1.
5. **Data files**: As first letter of my surname starts with “D”, I am supposed to use following files: inst-0.tsp,inst-5.tsp and inst-13.tsp. So these files are necessary
6. **config<config-number>.txt:** These are output files for different types of configurations. Each file has the best fitness from 5 iterations each, time taken to complete each of 5 iterations and average fitness of all 5 iterations’ best fitnesses and time taken to complete all the 5 iterations.

How to setup:

1. Download the zip file submitted.
2. Extract the file at any location and make sure each file is in the same location.
3. Open file configs.json and change config according to you preference.
4. Each dictionary in list of dictionaries is a configuration.
5. Below are the choice and their numbers (By default, the config is setup as per the assignment requirements.):
   1. Population generation:

‘0’: Random

‘1’: Heuristic

* 1. Parent Selection:

‘0’: Random

‘1’: Stochastic

* 1. Crossovers:

‘0’: Uniform Crossover

‘1’: PMX Crossover

* 1. Mutation:

‘0’: Inversion Mutation

‘1’: Reciprocal Exchange Mutation

1. Change the config as per your needs and follow the next steps.

Steps to run the solution:

1. Navigate to the location where the submitted files are extracted.
2. Open terminal/CMD on that location.
3. Run below command

python SD\_R00183334.py <data-filename.tsp>

1. Based on the configuration in the configs.json, output files will be generated.