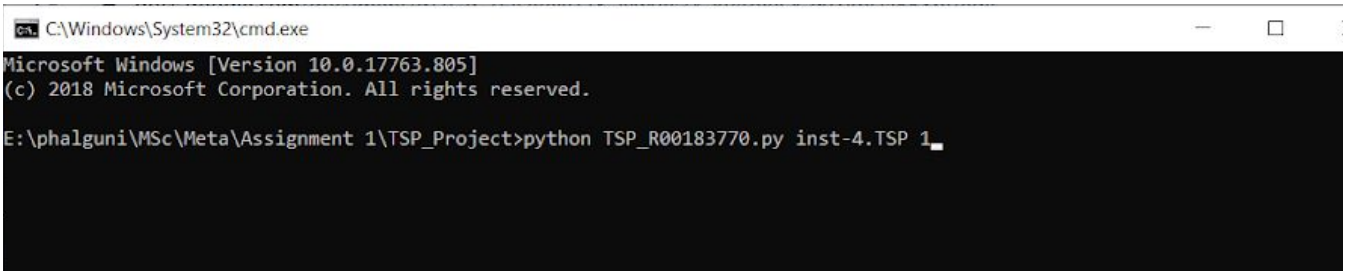
Sample File for TSP_R00183770.py

System Requirement:
Not necessary but recommended: Windows 10 | i5 8th Gen | 8 GB Ram

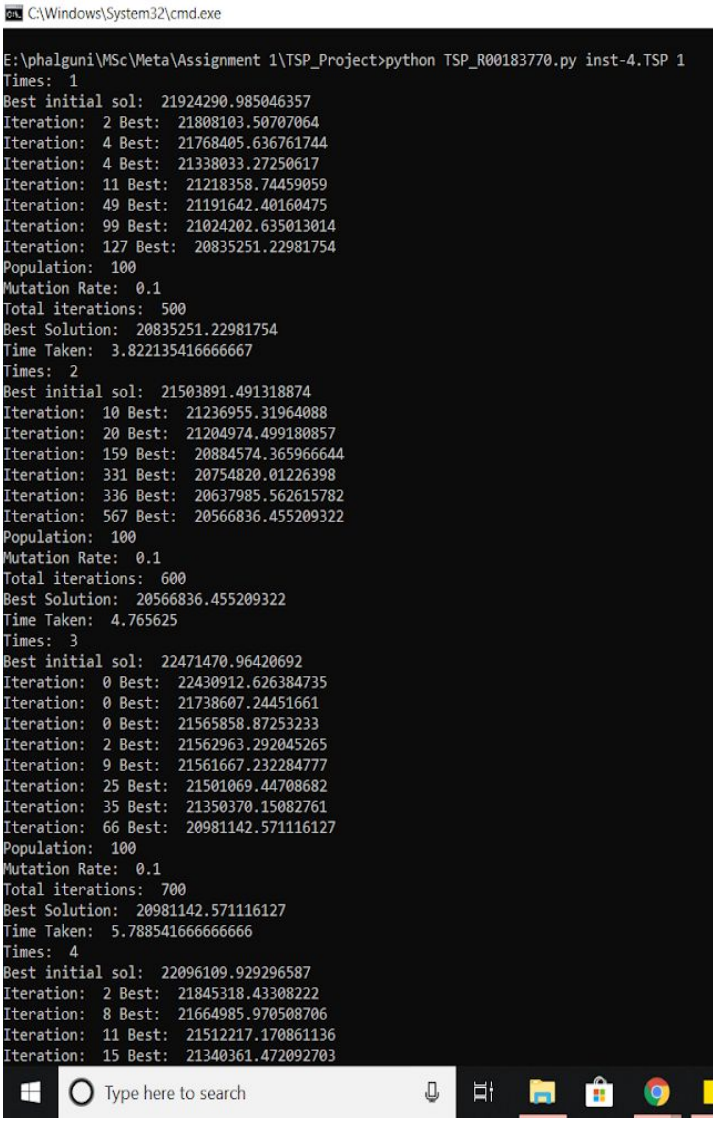
The file can be executed from Command line

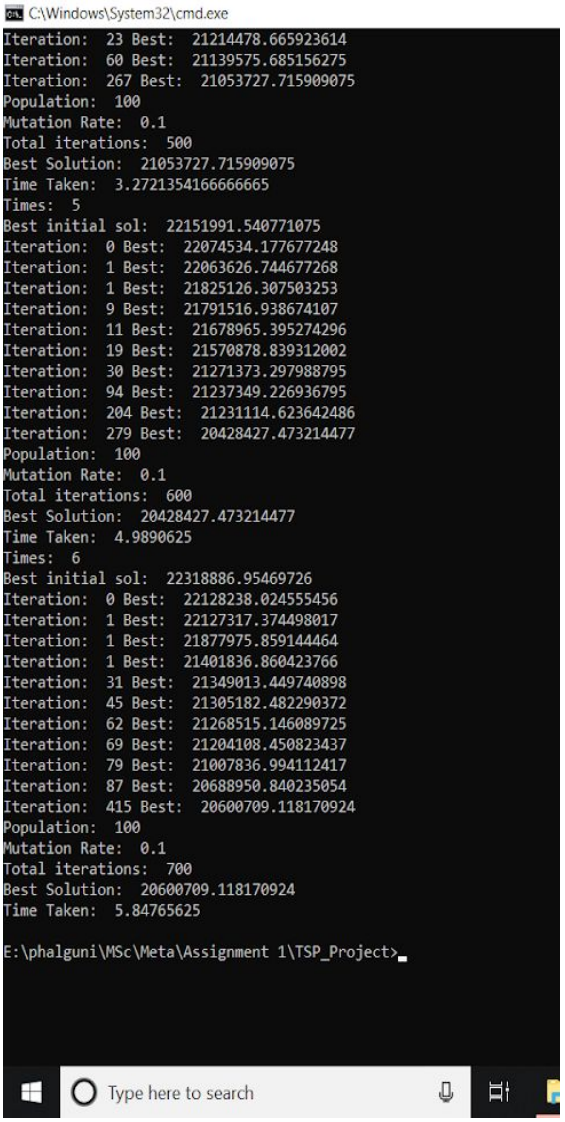
Steps to Run the file:

1. Download the zip file & extract it.
2. Go to cmd in folder where all files are extracted and run
    a. python TSP_R00183770.py inst-4.TSP 1
    b. python TSP_R00183770.py file_name config_number



3. The expected output will be like this





4. Along with this, an output file is also generated and is expected to be in the same folder where this program is.
    a. Filename nomenclature: “inputFilename_Config_givenConfigNumber.txt”
5. File generated after running above config is also attached in zip file as sample, look for “inst-4.TSPConfig_1.txt”

Additions & Changes to Skeleton Code

1. Added 3 new class variables,
    a. _config/Self.config : _config to take the configuration from user for executing it
    b. Self.choice : It chooses between Random(1) or Heuristic(2) Initialization. It’s updated according to config selected by user.
    c. self.fit_parents_list : list to store the new pool of fittest parents among all via SUS
2. Added a if-elif conditions to choose the set of functions according to users config.
3. Added self.minimization(): To calculate minimized & normalized fitness. This is called in SUS function.
4. Default Values Given:
    a. Iterations = 500
        i. It is increased till 700 by incrementing +100 after in each iterations and resets at 4th Run(Times) to 500 again
        ii. If config selected has “Heuristic function” then, incrementing & keeping 500 for all iterations
    b. Pop = 100 for Config(1-6) and Pop = 50 for Config 7,8
        i. It is set to pop = 200 at 4th Run for Config 1-6
        ii. No changes for Config 7,8
    c. MutRate = 0.1
        i. It resets to mutRate = 0.5 at 4th Run for all configs
5. Added code to create a file to save output for future use
    a. Filename nomenclature: “inputFilename_Config_givenConfigNumber.txt”
    b. File is saved in the same folder as the TSP_R00183770.py file exists.

Issues

- The program is taking 5-10 hours for running the dataset of 823 cities for a single run of 500 iterations & 50 population
- The suspected reason for this is either the SUS Code or Heuristic Code.
- SUS Code when running with Random initialization is taking reasonable time (< 1 hour, in general)
- But SUS Code when running with Heuristic function is taking massive time (>5 hours)
- Also, tried running heuristic with Random Selection and it is still taking a lot of time (>3.5 -10+ hours)
- With above experience I estimate the reason is the Heuristic Code.

- Upon Investigation of the Heuristic code, it is found that it have multiple nested loops which could be the reason for the increased time complexity coupled with huge datasets, it is taking so long time.
- I have included results from both for Both SUS + Heuristic as well as Random + Heuristic.
- SUS+Random can be compared & checked with Config 1-6