CINN Assignment 1 Report

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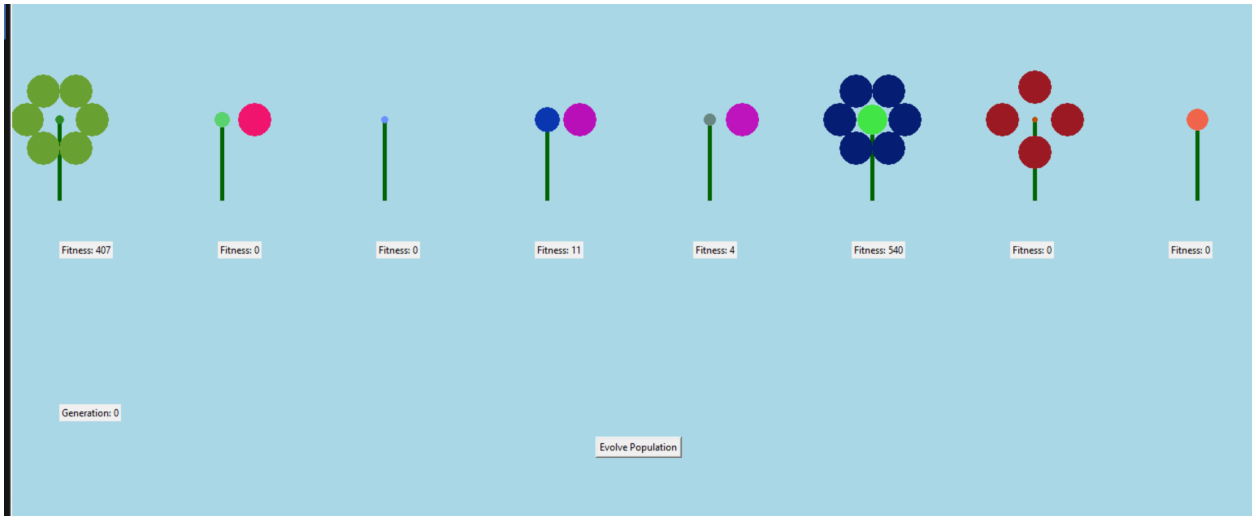
Implementation Details:

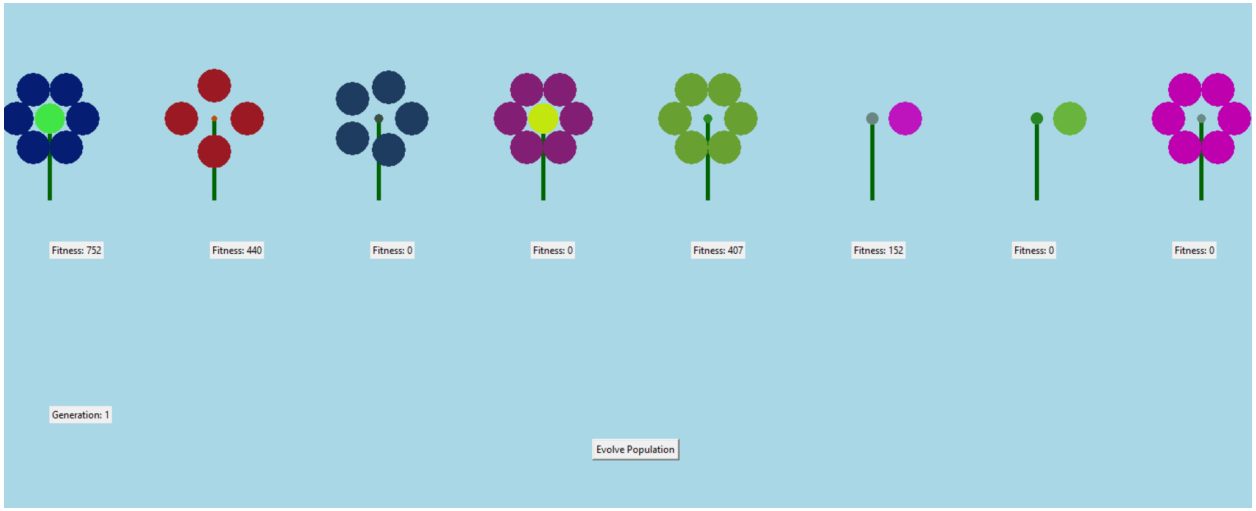
The assignment is divided into 3 python files containing the code. The first file is Flower.py which is responsible for creating instances of flowers with their attributes which are; center_size, center_color, petals_number, petals_color and finally its fitness.

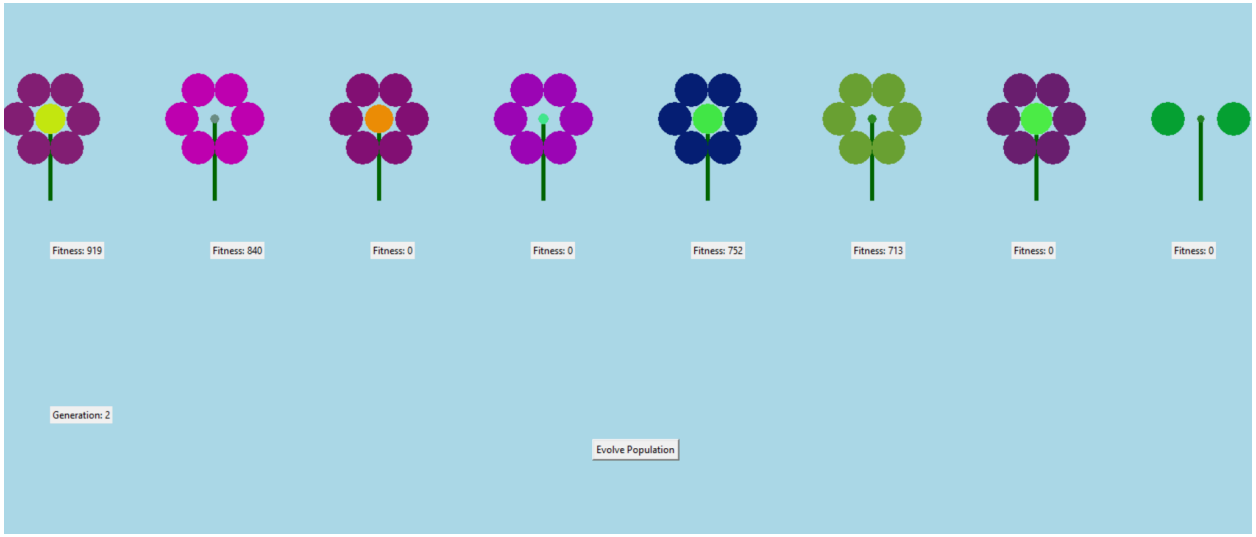
The second python file is the GeneticAlgorithm.py which contains the methods of the GA, these methods are, init_population, selection, crossover_number, crossover, mutate_color, mutate_petals, mutate and finally evolve_population. As the naming of the methods suggest, init_population is used for initializing the population, selection is used to sort the population according to flower fitness, crossover_numbers is a helper method for crossover, mutate_color, mutate_petals are helpers for mutate and evolve_population is responsible for utilizing the above methods to create a new generation based on the fitness of individuals where the top 4 members mate providing us with 4 children and the cycle goes on. Mutation rate is 0.05 and it toggles a random bit in each of the binary representation of flower's attributes.

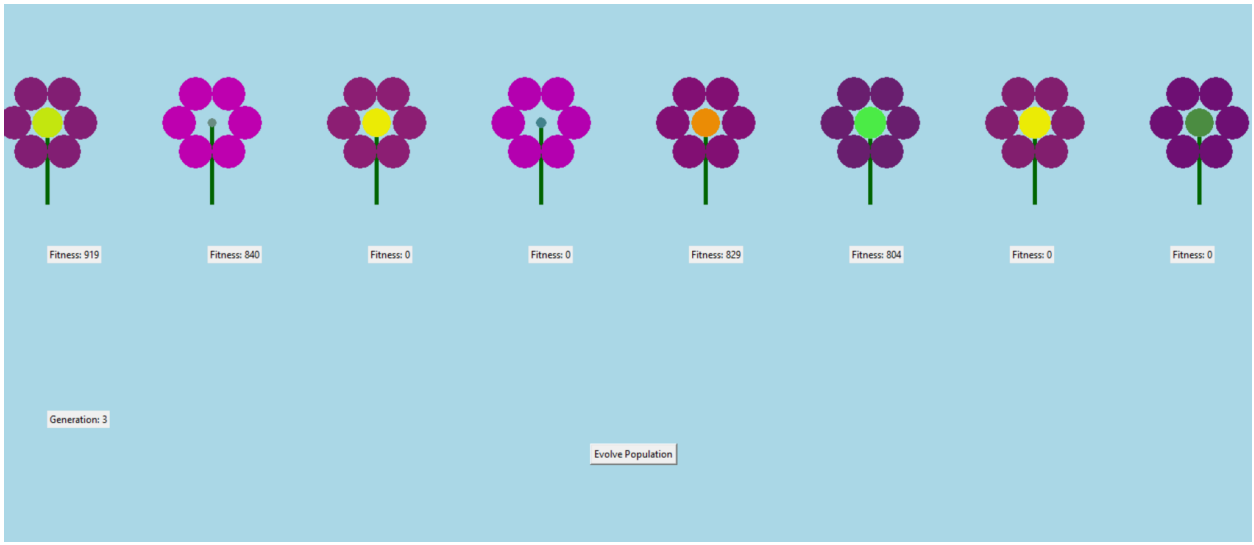
The third python file is Interface.py which is the driver file for the assignment used for creating the GUI using TKinter and the logic of mouse hovering on the flowers. The three of us contributed to the assignment equally and no particular tasks were assigned to individual members.

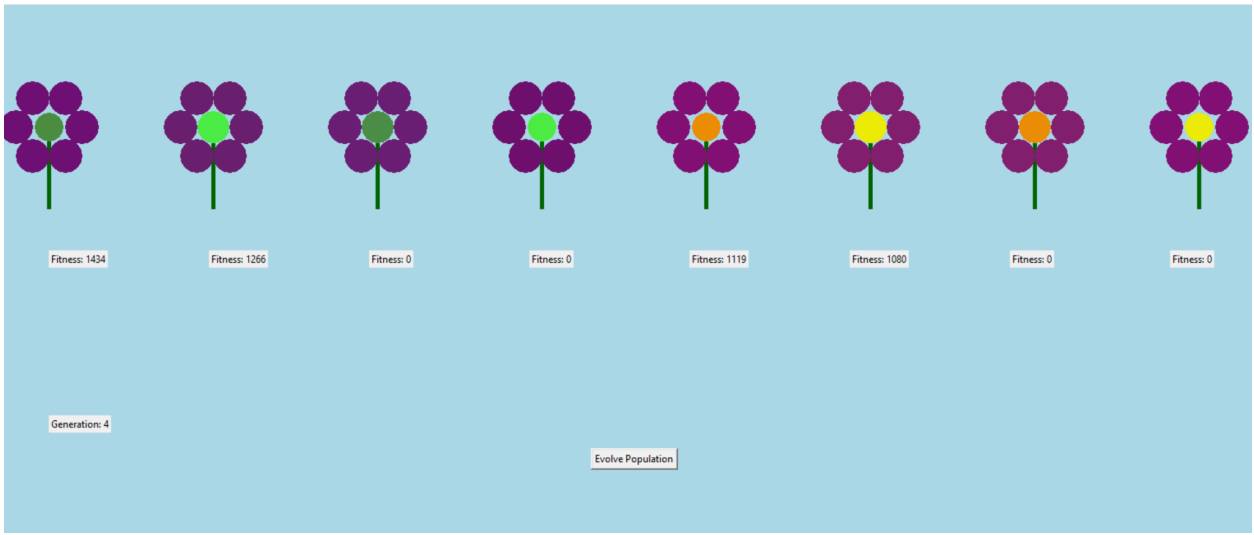
Snapshots of the program:

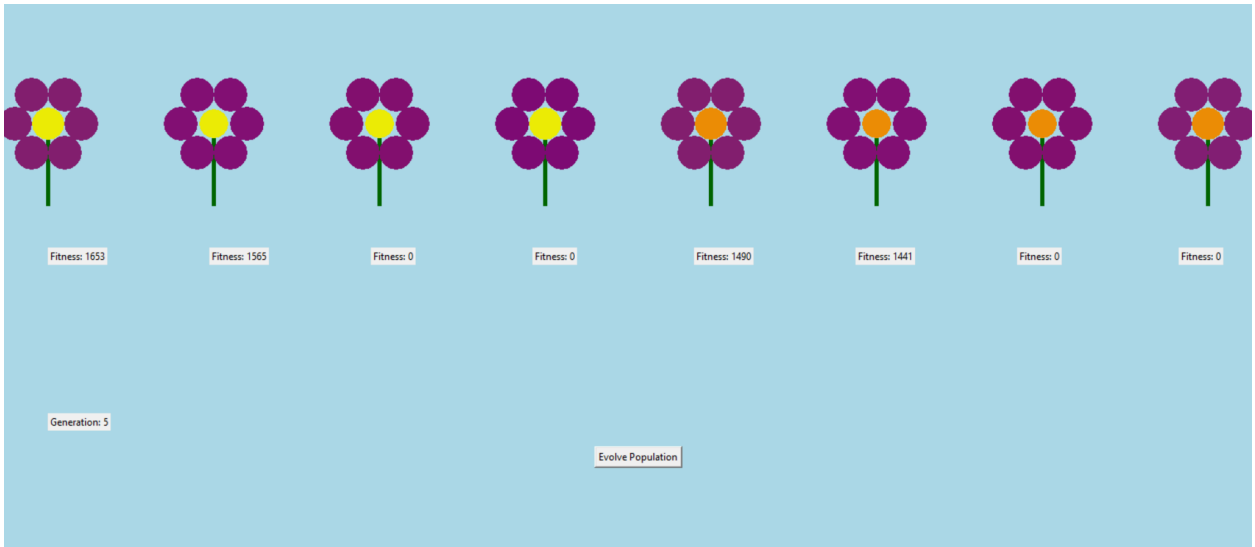

Fitness: 407
Fitness: 0
Fitness: 0
Fitness: 11
Fitness: 4
Fitness: 540
Fitness: 0
Fitness: 0
Generation: 0
Evolve Population

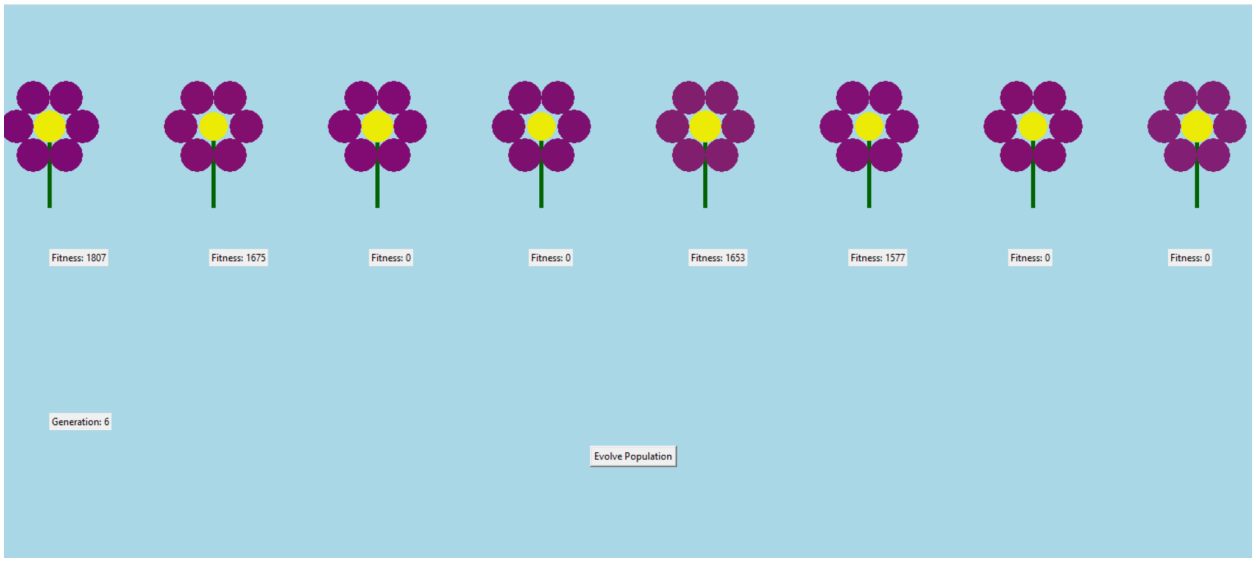

Fitness: 752
Fitness: 440
Fitness: 0
Fitness: 0
Fitness: 407
Fitness: 152
Fitness: 0
Fitness: 0
Generation: 1
Evolve Population


Fitness: 919
Fitness: 840
Fitness: 0
Fitness: 0
Fitness: 752
Fitness: 713
Fitness: 0
Fitness: 0
Generation: 2
Evolve Population


Fitness: 919
Fitness: 840
Fitness: 0
Fitness: 0
Fitness: 829
Fitness: 804
Fitness: 0
Fitness: 0
Generation: 3
Evolve Population


Fitness: 1434
Fitness: 1266
Fitness: 0
Fitness: 0
Fitness: 1119
Fitness: 1080
Fitness: 0
Fitness: 0
Generation: 4
Evolve Population


Fitness: 1653
Fitness: 1565
Fitness: 0
Fitness: 0
Fitness: 1490
Fitness: 1441
Fitness: 0
Fitness: 0
Generation: 5
Evolve Population



As you can see, after 6 generations the flowers were all influenced by fitness choices from previous generations which fulfills the task.