**Genetic Algorithm**

**Population Encoding**

I generated 100 2D integer arrays and initialize them with random pixel values from 0-255.

**Fitness Function and Value of the Fitness Function for the Best Solution**

Fitness Function is sum of absolute differences of Target image pixels with Population pixels.

The best value of the Fitness Function is 0 when the Population matrix contains exactly same pixels as the Target Image.

**How did you do crossover and mutation?**

For crossover I generated to two pivots one is row pivot ranging from 0 to ROW and other is column pivot ranging from 0 to COL then copy all the data from these indices to the end in another matrix named as temp then copy this area of let’s say B into A and data in temp back to B.

For mutation I generated tow random pivots for row and column and then generate a random pixel value from 0-255 and then place this pixel in population indices generated by rand ().

For both crossover and mutation I choose the already best population so that solution can converge as early as possible.

**Population size and convergence**

We generated 100 random 2D arrays. We also run our code on 10 population size and 1000 population size to see the results but 100 is the most accurate and perfect population size other two converges but after so many generations so population size 100 is the best.

Yes at generation 500 image starts appearing at generation 5000 – 7000 the image become very much visible and accurate then finally at 10000 it completely converges and gives us the perfect results.

**What are the rate values?**

The rate value for the selection is 20% then we have 40% population generated by the crossover and lastly we have 40% population generated by mutation our working was on the fittest population.

**How Many Iteration required?**

For crossover and mutation beyond s:

Converges on 40k generation

Using entire population:

Converges on 25k generation

Using fittest population:

Converges on 10k generation

RESULTS AFTER 500, 2500, 5000, 10000 are attached.

