Problem Statement:
An image contrast enhancement method based on genetic algorithm

Task 1:
Research paper link: https://ieeexplore.ieee.org/abstract/document/5190563
Domain: Image Processing
Summary of the paper:

1. Problem that the paper solves
   Image contrast method

2.
   a. Encoding Scheme used in chromosome representation
      No encoding scheme. Direct gray levels of image are used

   b. Selection, Mutation and Crossover
      Roulette Wheel selection
      Two-point crossover
      Random value reset mutation

   c. Fitness function
      fitness(x) = log (log (sum of intensities)) x no of edges in enhanced images

3. Results observed

Table 2. Number of detected edges

Image	proposed GA method	HE	GLG	AGLG	Presented method in[8]
Galaxia	1964	1347	1350	1256	1819
7741	2887	2309	2473	2869	1430
Crowd	3495	3327	3408	3475	3135

Table 3. PSNR $= 10 * \log_{10} (L-1)^2 / MSE$

Image	proposed GA method	HE	GLG	AGLG	Presented method in[8]
Galaxia	14.16	11.52	11.30	11.49	13.9
7741	13.75	12.46	12.15	13.71	13.29
Crowd	20.12	12.98	12.81	13.15	20.07

4. Observations
   More enhancement in the proposed paper
   also noise is not enhanced in the proposed paper, while in other algorithms like HE, GLG

the noise is also enhanced.

5. Conclusions
   Overcomes previous shortcomings and proved more effective than other commonly used methods.

Task 2: Implement the chosen research paper by using the same components mentioned in the paper. Also, use other types of components (other encoding/ selection/crossover/mutation schemes) and obtain a comparative analysis of the same.
This will be done by the students in the second session.

Tool/Language:
Programming language: Python
Tool: Jupyter notebook

[Code and explanation in second pdf file]