Implementation of Genetic Algorithm

Java Project Report

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Problem Statement

- The basic idea is to learn and understand the working of a Genetic Algorithm.

- We have programmed a Genetic Algorithm in Java that takes an image as input and approximates the image using circles/rectangles of different dimensions and colors

Outcomes of the project

- We ran our algorithm on several different types of images, specifically logos of various famous companies.
- We have shown the stage-wise progress of the algorithm by generating the intermediate images.
- Final image generated is quite a good approximation of the original image and the algorithm performed reasonably well after setting appropriate parameters.
- The algorithm takes significant time to run (~20 hours for 100k generations) because it is highly computationally expensive

Screenshots

Nike

Overview of the project

The most important aspect of our code is the fitness function. The fitness function is defined as:

```
ans += ((Math.pow(2,abs(m.getRed() - n.getRed())/255.0) + Math.pow(2,abs(m.getGreen() -
n.getGreen())/255. 0) + Math.pow(2,abs(m.getBlue() - n.getBlue())/255.0)) )/6.0;
```

```
this.fitness = 100000.0/ans;
```

We have used Java libraries to convert the input image to 2D array and also used Java libraries to convert the output 2D array to an image.

Our program involves several parameters:

- POPSIZE = 15;
- MAXGENS = 150000;
- PXOVER = 0.8;
- PMUTATION = 0.1;
- CircleCount = 50;
- RADIUSLIMIT=175;
- PMUTATIONCOLOR = .2;

The following is the order of function calls:

- Selector();
- Crossover();
- Mutate();
- Evaluate();
- elitist();

Code

Thank You