Image Processing - Team Project 1

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Abstract

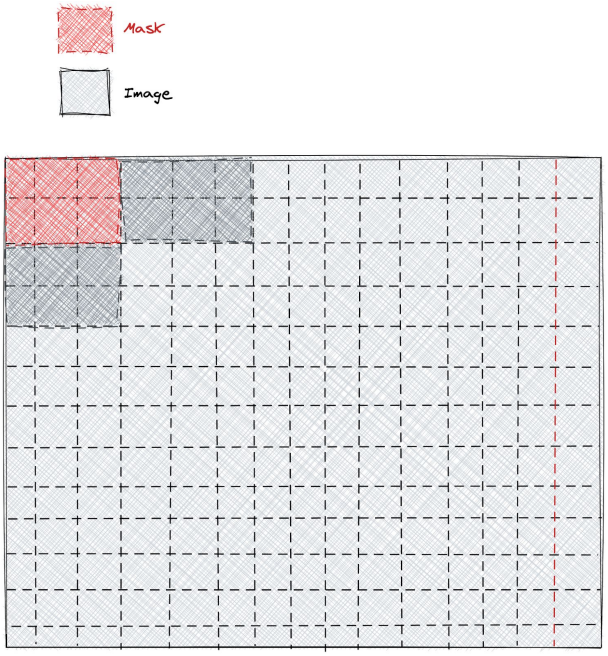
The goal of this first team project was to create a program that can perform form recognition (squares and triangles). To do so we had to use the OpenCV library in order to open the image and get the pixel values of the image to finally implement our form recognition algorithm in C++ language.

Algorithm implementation

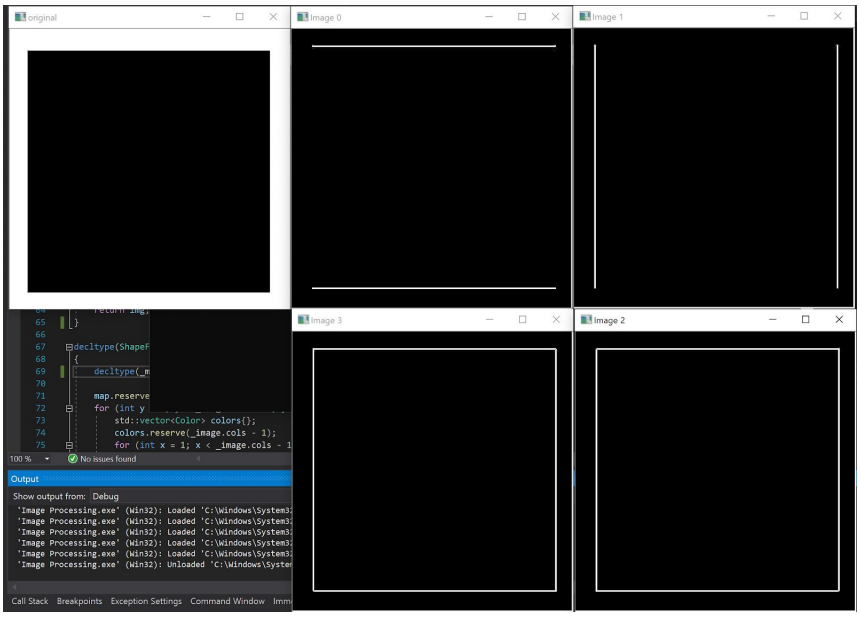
The form recognition has to be done in multiple steps:

- Edge detection
- Angles or lines detection
- Form recognition

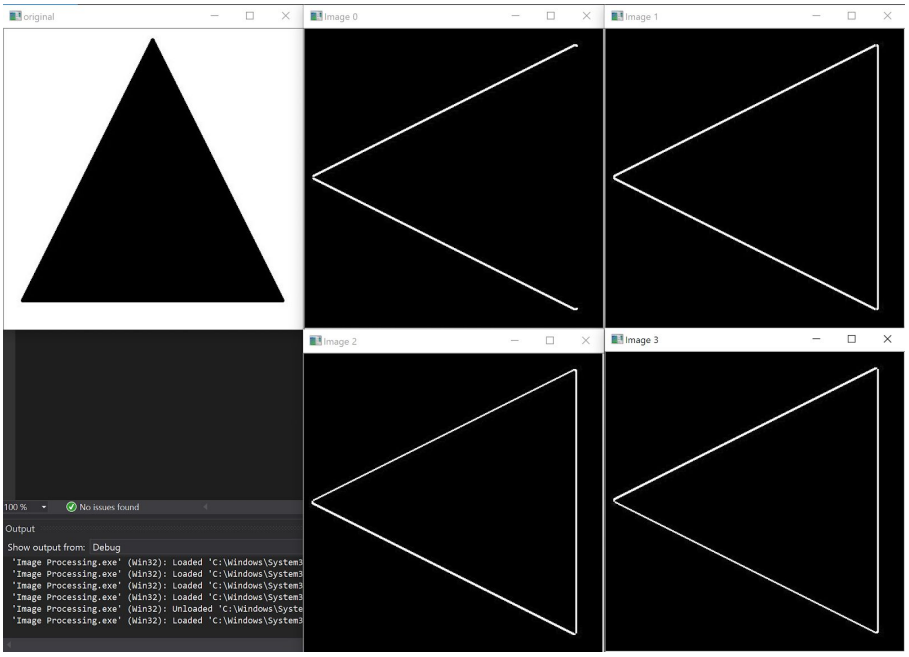
Our first goal was to perform edge detection. This let us only draw the form borders before performing additional computation. We used the Sobel filter since it perfectly fitted our needs for this project. By applying 3x3 masks (horizontal, vertical and diagonals) which are convolved with the original image.



The program has been made with modern C++ features and implemented using object programming. When applying the filter we obtained good results:



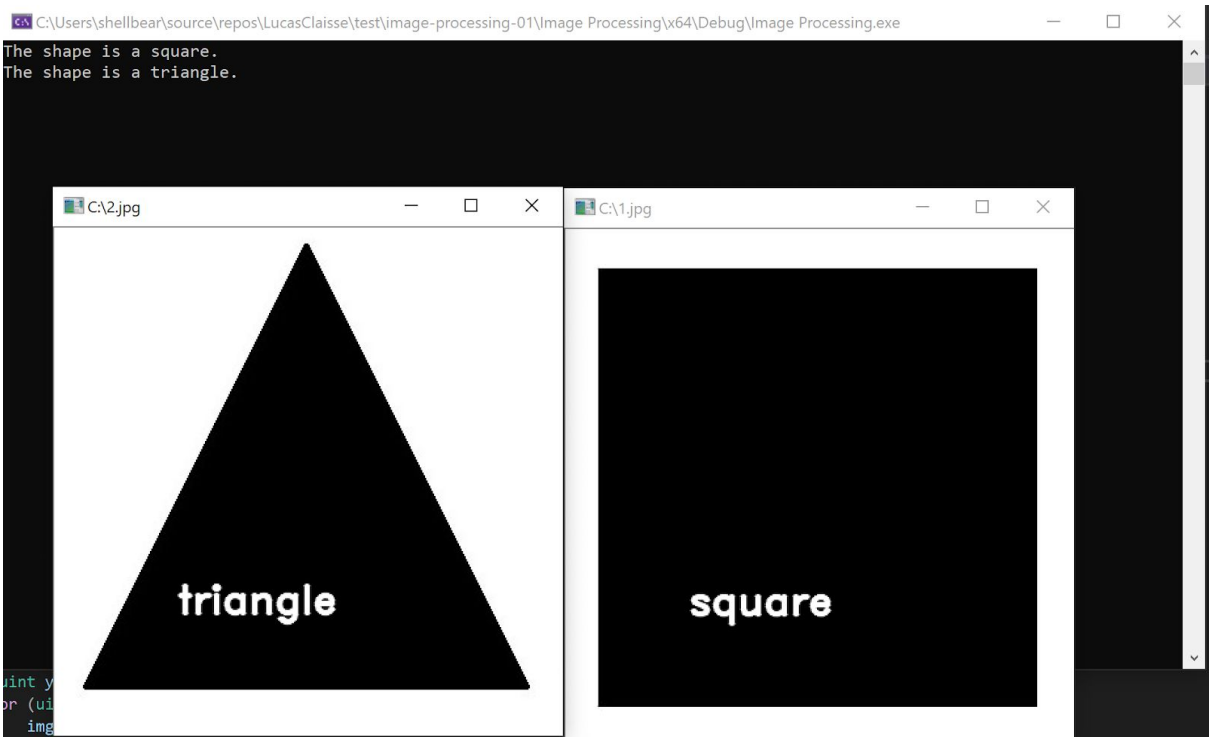
Square edge detection



Triangle edge detection

The last part of the algorithm was to detect the type of shape it was. We achieve this problem by finding every corner of the shape, and counting them gives us the type of the shape: 4 corners is a square, and 3 corners is a triangle.
To do that, we start from every corner of the image, and run through every pixel to find the first white pixel, we deduced that this pixel was a corner.

In order to test our results we were able to use the OpenCV library to add text to the final image. Here are the final results:



Form recognition

Organization

Since we live in the same house, the organisation was easier for us. From the beginning to the end of the project we worked in peer programming and implemented together every part of the project. We spent almost 3 entire days to achieve this project.

Antoine thoughts on project

I found this project really interesting and enriching since I learned a lot about form and edges recognition methods. I was always curious to understand how modern technologies like scanning pictures from a smartphone for which we only take a picture of a physical picture or document and thanks to form recognition the image or document is correctly cropped like it would have been scanned with a scanner.

Lucas thoughts on project

This project was a first for me, I discovered the opencv library with this project and I found it interesting. I found it quite hard to do it from scratch but I took it as a challenge.