OBJECT COUNTING

Project 1

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Abstract

In this report, the first project of the programming studio course written in the Python software language, "object counting", and the following steps were written.

Problem Definition:

In an image, the code will count how many object on that image. This can be useful for a place that needs to count how many substance or an image.

Solution methods

There are two solution methods:

1)Levialdi Algorithms

2)TSF Algorithms

1)Levialdi Algorithms:

Levialdi's shrinking algorithm shrinks every connected component in a binary image to a single isolated point to the upper right corner of its bounding rectangle and erases it.

2)TSF Algorithms

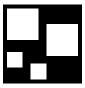
In this approach, the image space is partitioned like a checkerboard into two disjoint sets: 1 and 2. Where 1 and 2 denote the two distinct subfields.

My Work

Images consist of pixels. I need to work with pixels. Firstly, image's pixels' need to convert to binary. And I take gray code function from my instructor. Now the image is gray. It needs to be black and white. Then I convert 0 and 1. Zero means the pixel is black, objects' white parts are 1.

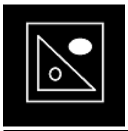
I started with Levialdi. Both algorithms have a while loop with ifs. Then TSF and it's functions. I cannot spend enough time to GUI. GUI needs much attention.

Results:



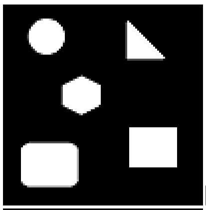
For this image

```
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.0 1.0 1.0 1.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Levialdi Counter: 4
Levialdi Iterations: 16
TSF counter: 4
TSF iterations: 6

Process finished with exit code 0
```



For this image, output is:

```
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.
Levialdi Counter: 4
Levialdi Iterations: 128
TSF counter: 4
TSF iterations: 65

Process finished with exit code 0
```



For this image, output is:

```
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Levialdi Counter: 5
Levialdi Iterations: 47
TSF counter: 5
TSF iterations: 15

Process finished with exit code 0
```

For this image, output is:

```
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0
Levialdi Counter: 16
Levialdi Iterations: 84
TSF counter: 16
TSF iterations: 46

Process finished with exit code 0
```

Contribution of this project:

I learn how to write in Python, and it's libraries. I struggle with complex code to write the algorithm. If I write GUI, I learn much more things for this project but the time was not enough.

Conclusions:

Levialdi is faster than TSF but it calculates much iterations. Time depends that