Number of Books stacked Vertically

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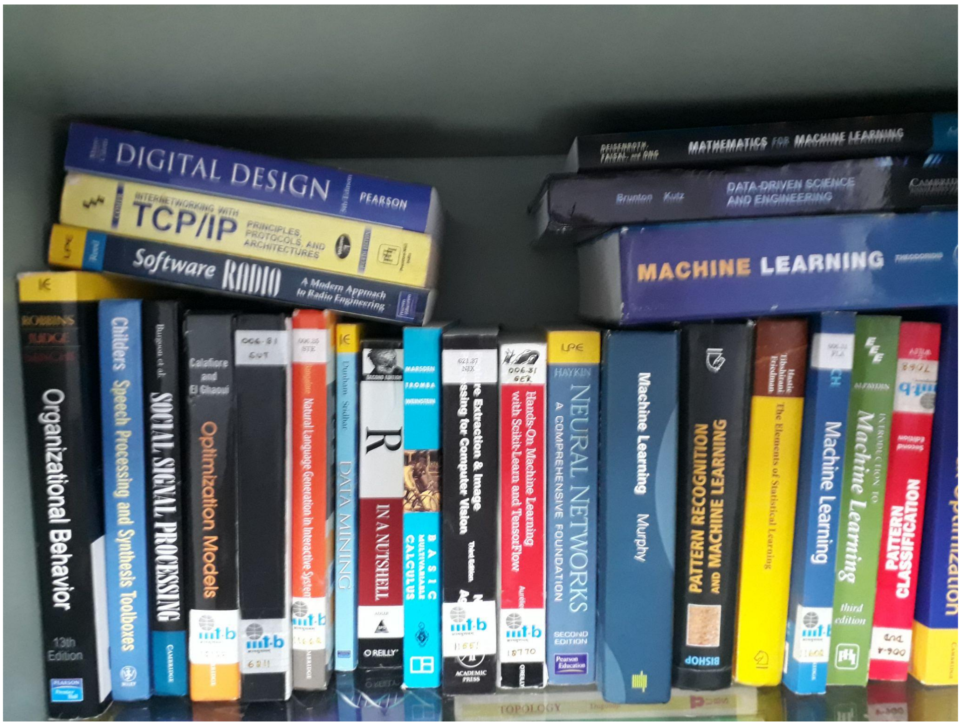
Problem Statement

Write a program to read the image attached and count the number of books stacked vertically.

Given

We were given an image with noise, it is as follows-



Preprocessing-

1. I imported the image from the repository.
2. I cropped the image as nearly the ⅓ of the upper part is not of any use as there are no books that are stacked vertically.
3. The image was very big in dimension and was getting out of the screen, so we rescaled the image.

Solution Approach-

I tried some stuff that I will be mentioning below. I got better results with the edges that were vertical. So we will count vertical edges, which would be nearly the same as the number of books.

Approaches I tried-

1. I converted the image to greyscale, but it was not useful, the edges were getting lost. Hence, I discarded this approach.
2. First, I used the normal image, but as colors may contribute to the accuracy of edges, I increased the contrast of the given image and I did get better results.
3. I tried Gaussian blur. It gave average results. But they had a lot of noise in it. Hence, I used Bilateral Blur. By doing this, a lot of noise was removed. And we got our best results.
4. For edge detection, I used both “Canny Edge” and “Sobel Edge”.
5. For the lines that I got, I used HoughLinesP.
6. I remove the noisy lines. For example, the lines that were horizontal. Or the lines which are very close as they represent the text.
7. Finally, I saved the image and printed the count of edges.

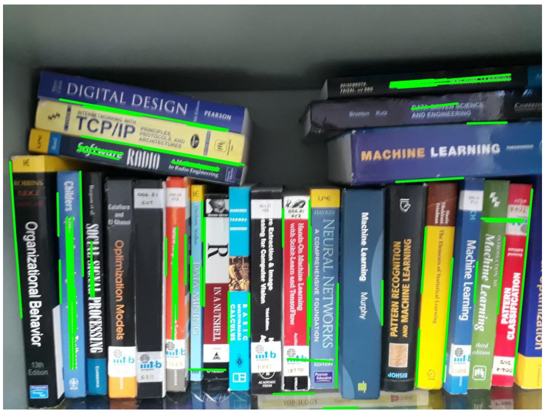
Hyperparameters-

- Rescaling Factor: **0.3**
- Cropping the image - **img[**`1400:2900]`
- Contrast of the image - **`createCLAHE(clipLimit=2, tileGridSize=(8,8))`**
- Bilateral Blur, **`bilateralFilter(img,35,75,75)`**
- Canny Edge Detection = **`Canny(bilateral_blur,50,200)`**
- Separating the lines, **`HoughLinesP(canny_edge, 3, 3.142 / 360, 200, None,50, 7)`**
- Deleted lines **`if(abs(x(point_on_line) - x(point_on_near_by_line)) < 7) or if line is horizontal (abs(y_1-y_2)<20).`**

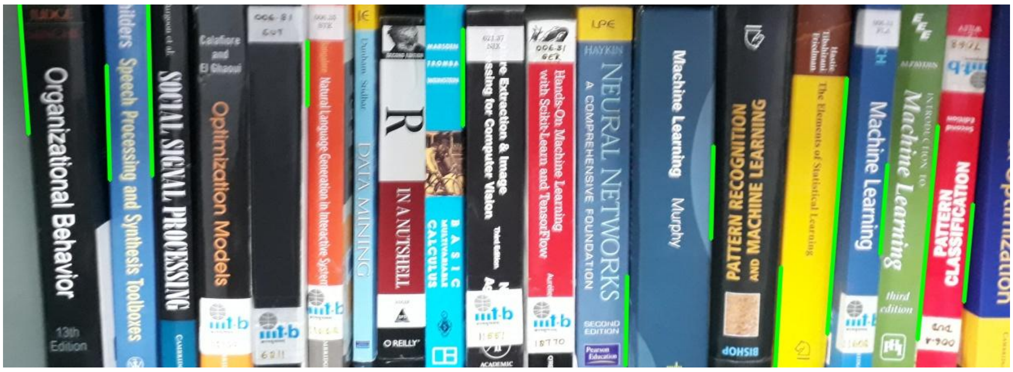
Best Result: Count = 16

Visual Results:

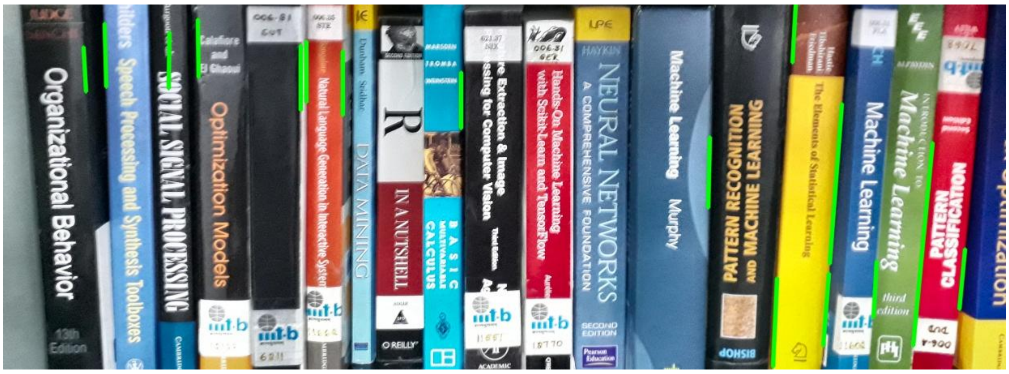
- **Initial:**



- **Without Contrast:**



- **Best:**



Resources Used

- **https://www.youtube.com/watch?v=oXlwWbU8l2o (First 57 minutes)**
- **StackOverQuestion on contrast of the image, link as follows, https://stackoverflow.com/questions/39308030/how-do-i-increase-the-contrast-of-an-image-in-python-opencv**

GitHub Repository - https://github.com/architsangal/Number-Of-Books-Edge-Detection