Assignment 1 (Progress Report)

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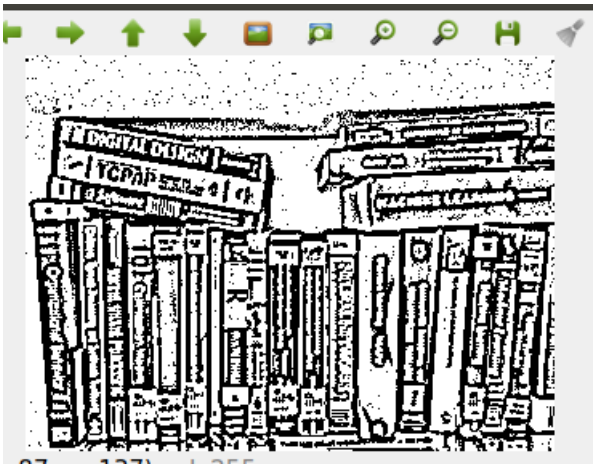
1. ***Book Counting:*** *Write a rule based algorithm to count the number of books in my shelf*

   Idea is to convert the image into black and white using adaptive thresholding like the one shown below.



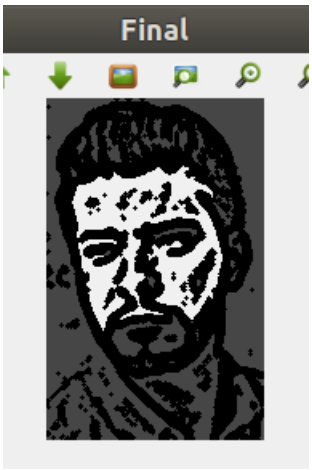
   We observe that some of the edges are not perfect.
   We use eroding technique using square kernel to close off some edges.
   Before performing thresholding we are converting the image to gray scale and also applying some blurring to reduce noise.
   Now We will perform a depth first search on pixels which are white in color. As we go along the search we mark the pixels visited.

   We keep track of 3 things heights, widths and areas of the visited spaces.
   We also set some aspect ratio relation among height and width failing which we discard the space for its potential to be a book.
   After all this to account for any unnecessary noise that might have affected our results we take median of areas and filter out the visited spaces further.

   Doing all this gives quite accurate results in most cases.
   In some cases it fails when the book is lying flat on the table (Not kept in the shelf).
   It was also notices that if the image is taken from angle such that the pages of the books are visible we get inaccurate results sometimes due to color of pages mixing with white background.

2. ***Pixels on your face:*** *Write an algorithm to mark out pixels of your face*

   This problem seems more challenging than the book counting problem.



   We can find a large group of pixels which fall in the range of skin colors.
   But this has its own limitations if there are similar coloured objects in the background like a bat handle or a bird etc. Maybe the image is clicked in a desert.

   We can also follow the approach used for book detection using custom rules for detecting face if we can close the edges around the face efficiently.
   But in many cases this is not seeming possible to close off the edges around the face. Some faces may have beard as seen in above image which can cause this method to fail.

   Another thought is that displaying a box around the face is a better idea than determining each individual pixel if we are using a rule based method because no deep learning is involved.

   Over the next week I will be trying more hypothesis and experiments to come up with strong algorithms for both problems.