Image Processing - ICMC USP - 2020

# Background Effects

## Partial Report

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**Main objective:**
      This project aims to change the background of a given image with a centered object on it by using image segmentation. The process necessarily includes image segmentation, but might also include background removal, background blur or background change of some kind, such as color change or filtering. The applications of the project are entirely focused on the arts, as aesthetics purposes in photography or personal entertainment.
      In the first place, we are going to implement background change in images with simple backgrounds, that means that they do not have many different colors or objects. For that, thresholding methods are going to be used. In a second moment, we are going to implement the segmentation for images with more complex backgrounds, with algorithms such as image segmentation with clustering.

**Images:**
      For the first part of the project we are going to use the three following images, acquired in free banking image website Burst (https://pt.shopify.com/burst).
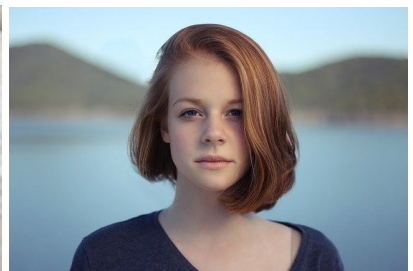


When we achieve success with simple backgrounds, we will move to images with contrasting patterns, such as bricks, and use the following images for tests, also acquired in the same website.

**Backgrounds:**

**Steps:**

1.  Pre-process the image with denoising methods (median filtering)
2.  Calculate the histogram for the denoised image
3.  Use the histogram to automatically calculate the threshold value by the Triangle Thresholding Method and apply the threshold to the image, getting a matrix of 0s and 1s. The Triangle Thresholding Method chooses the value that forms the triangle with the biggest $d$ (as shown on the image above) as the threshold.

INTENSITY HISTOGRAM
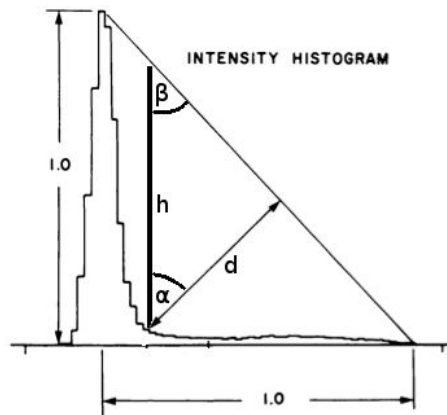
4. Use the altered image as a map to know where to apply the desired effect on the borders of the original image (apply the change to every pixel of the line until it reaches a black pixel, then change to the next line. Do this for both the right side and left side of the image).

Initial code can be found at: https://github.com/kakomarina/background-effects