Intro to Computer Vision: HW 1

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Problem 1a

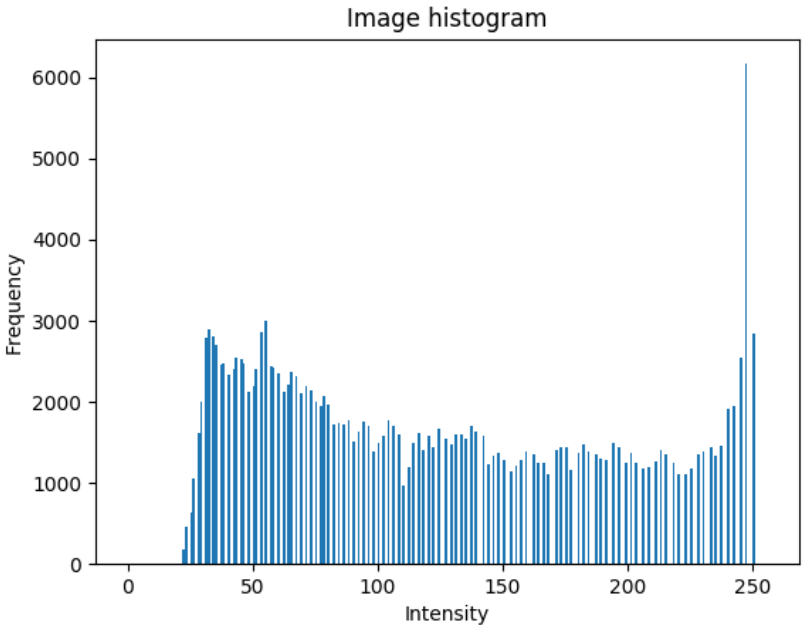
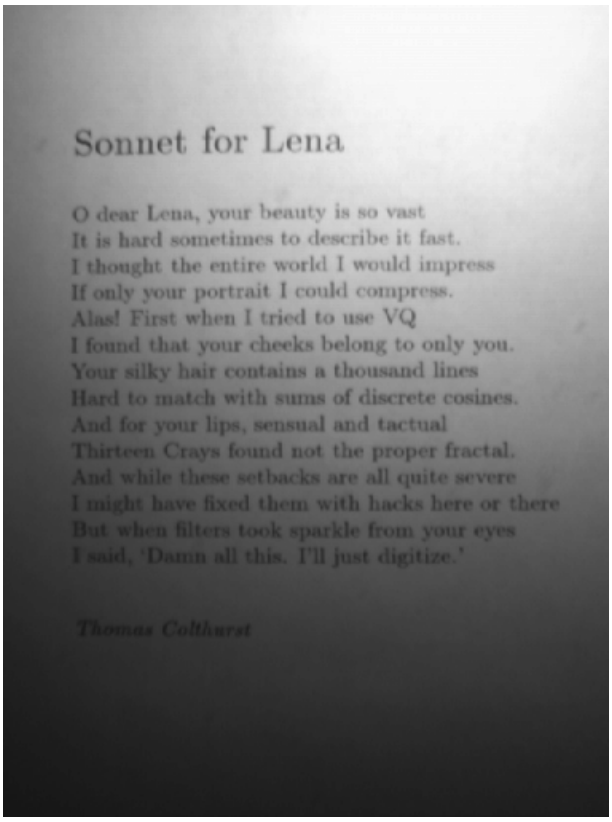
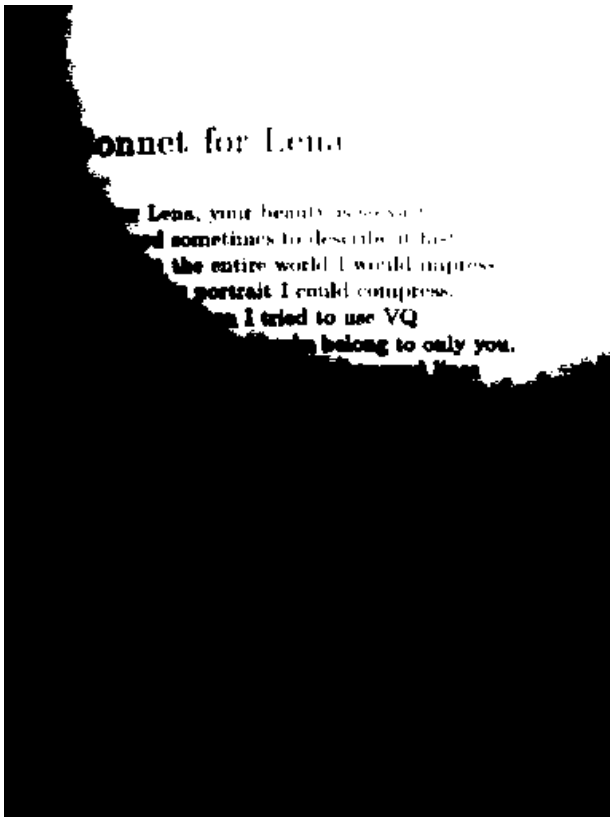


Figure 1: Image intensity histogram for sonnet.png

Problem 1b

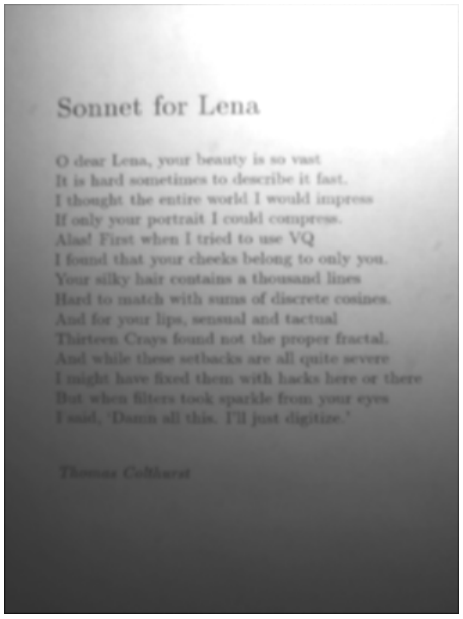


(a) Original image

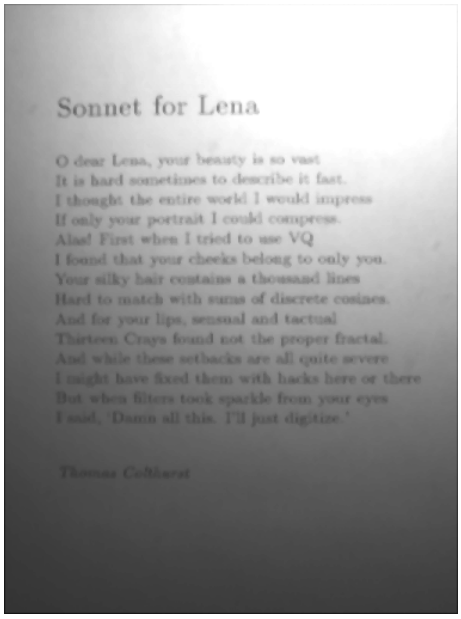


(b) Using a static threshold of 150 intensity

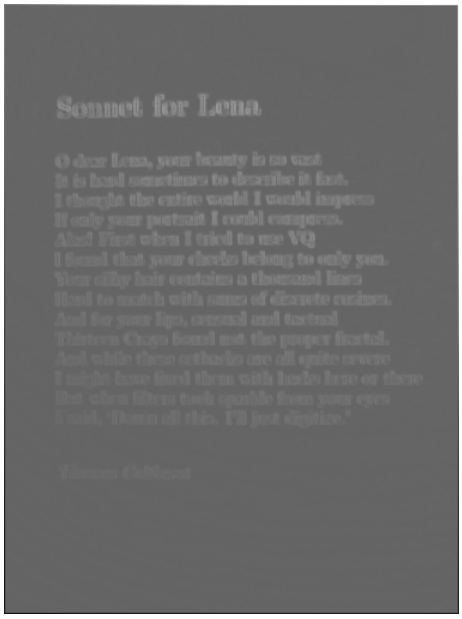
Problem 1c



(a) Mean Adaptive Threshold
n=1, c=30



(b) Median Adaptive Threshold
n=1, c=30



(c) Max-min Adaptive Threshold
n=1, c=100

Overall, calculating the new pixel value using the mean of its neighborhood ended up creating more blur. Using a median method reduced the fuzziness of the individual letters and somewhat increased contrast.

Generally, the larger the neighborhood, the more fuzzy the image became after applying the thresholding. Therefore, only a 3x3 neighborhood centered on the pixel was used in all of the above thresholds. Using too large of a constant c caused the upper right of the image to whiten out the letters there, so a constant increase of 30 was used for both the mean and median thresholds.

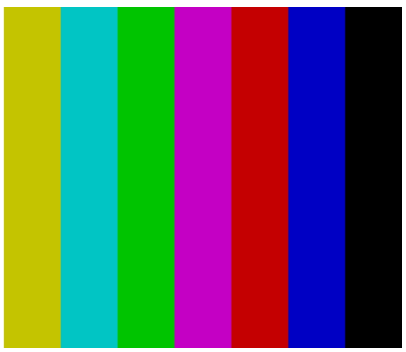
Using the max-min adaptive thresholding produced some interesting results. It seems to have inverted the image, but did not increase the visibility of the letters since a lot of blur was introduced to the image.

Problem 2a

(a) Original image

(b) Alice with the blue channel set to 0

Problem 2b



(a) Original color swatch

(b) Intensity set to equally weighted mean of RGB

(c) Intensity set to relative luminance

Using an intensity set to the weighted mean doesn't give a meaningful difference between the colors. From the original swatch, yellow, cyan, and magenta all look identical in their grayscale image using an equally

weighted mean. Using an intensity equal to their relatively luminance tells us that the colors in the color swatch increase in relative luminance from right to left.

Problem 2c/d

Figure 6: Alice shifted by 120 in every channel and clamped

Shifting and clamping the whole image whitens the entire image. Areas in the original image that were already light colored blend in with one another. This causes existing dark colored regions to stand out more and reduces the variation of intensities across the entire image. Could this be used for potential noise reduction?

Problem 2e

Figure 7: Alice with saturation increased by 25

Increasing the saturation of the image makes the colors richer and more visible but creates some artifacts. For example, there are now regions of blue on Alice's forehead. Using a value of 25 seemed to be the right balance because a lower value would have no visible effect while a higher value would increase the amount and size of the splotches like on Alice's forehead.

If you have any questions, comments, or concerns, please contact me at alvin@omgimanerd.tech