TASK 5

Yes, contrast stretching does affect the histogram of an image.

[Contrast stretching is a process that aims to increase the difference between the maximum and minimum intensity values in an image1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization). [All other intensity values are spread out between this range1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization). [This process changes the distribution of pixel intensities in the image, which is reflected in the histogram2](https://www.allaboutcircuits.com/technical-articles/understanding-contrast-histograms-and-standard-deviation-in-digital-imagery/).

In contrast stretching, there exists a one-to-one relationship of the intensity values between the source image and the target image. [This means that the original image can be restored from the contrast-stretched image1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization). [However, it’s important to note that while contrast stretching enhances the contrast, it maintains the overall shape of the histogram1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).

On the other hand, histogram equalization is another method for enhancing contrast. [It modifies the intensity values of all pixels in such a way that the histogram becomes more uniform or "flattened"1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization). [This process results in a change in the overall shape of the histogram1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).

[In summary, both contrast stretching and histogram equalization aim to enhance image contrast by adjusting pixel intensities, but they do so in different ways and have different effects on the image’s histogram1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).

TASK 5 AND 6

Contrast stretching and histogram equalization are both techniques used to enhance the contrast of an image, and they can be particularly useful when preparing an image for binarization. However, they work in different ways and can have different effects on the image, so the best choice depends on the specific characteristics of your image and what you’re trying to achieve.

[**Contrast Stretching**1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization)[2](https://www.cambridge.org/core/services/aop-cambridge-core/content/view/9487835983B0D1A1E47F1DE2918567EB/S1551929500066797a.pdf/histogram_stretching_or_histogram_equalization_in_image_processing.pdf)[3](https://medium.com/@qasimsaeed590/difference-between-histogram-equalization-contrast-stretching-9115015896):

* [It increases the difference between the maximum and minimum pixel intensity values in an image1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).
* [It maps the minimum intensity in the image to the minimum value in the range, and it maps the maximum intensity in the image to the maximum value in the range1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).
* [The overall shape of the histogram remains the same1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).
* [It can be unreliable if there exist only two pixels with 0 and 255 intensity1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).

[**Histogram Equalization**1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization)[4](https://dsp.stackexchange.com/questions/46564/what-is-the-difference-between-image-normalization-contrast-stretching-and)[3](https://medium.com/@qasimsaeed590/difference-between-histogram-equalization-contrast-stretching-9115015896):

* [It modifies the intensity values of all pixels in the image such that the histogram is “flattened” into a uniform distribution1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).
* [Once histogram equalization is performed, there is no way of getting back the original image1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).
* [It uses a probability distribution1](https://stackoverflow.com/questions/41118808/difference-between-contrast-stretching-and-histogram-equalization).

In general, if your goal is to enhance contrast for binarization, you might start with contrast stretching as it’s simpler and less destructive. If that doesn’t give satisfactory results, you could then try histogram equalization. Remember that these techniques are not mutually exclusive and can be used together if needed. Ultimately, the choice between these two methods depends on your specific use case and may require some experimentation.