Lab 1. Preparation tasks
Template for answers

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Submission date: 2023-11-09
Version (in case you need to re-submit): 1

1. Basic image operations and data types

1 A) What is the highest pixel value in the image?

The highest pixel value is 253.

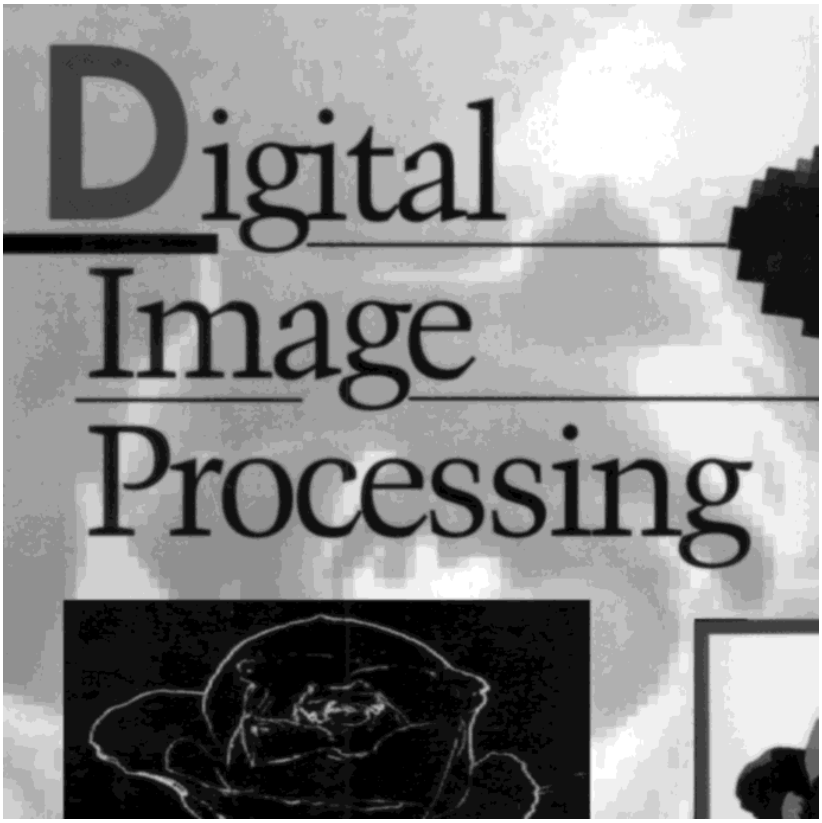
1 B) What is the maximum value for `Image2`?

The maximum value for Image2 is 16

1 C) What do you see if you display `Image2`?

We can see a dark version of image 1 since every pixel value has been divided by 16.

1 D) Image3:



1 E) How many gray levels does `Image3` have?

Image3 has 17 different gray levels. Every pixel value is rounded to the nearest multiple of 16, which gives us 16 + 1 different values between 0 and 255.

1 F) Explain what has happened to the image after these operations!

Every pixel value is first divided and rounded into values between 0 and 16. The values are then scaled back to 0 to 255, which results in every pixel value being a multiple of 16.

1 G) Explain the difference between using `uint8` images and `double` images in this task.

The difference between uint8 and double is how doubles can store decimal values. This removes the needed rounding which occurs with uint8, since uint8 is only able to store integer values. This makes sure operations such as division and then multiplication result in almost (rounding is still possible) the same values while using doubles.

1 H) Which class (data type) should you make sure to use when applying such operations to images?

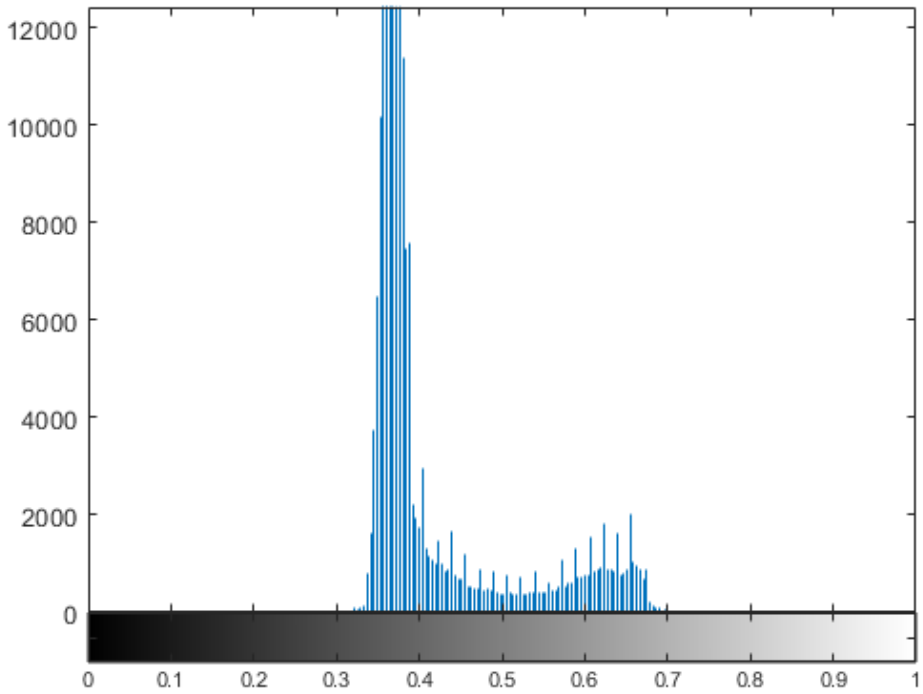
Since we want each operation to keep as much information about the original image as possible. Therefor we want to use double or some similar data type.

2. Contrast stretching and image histogram

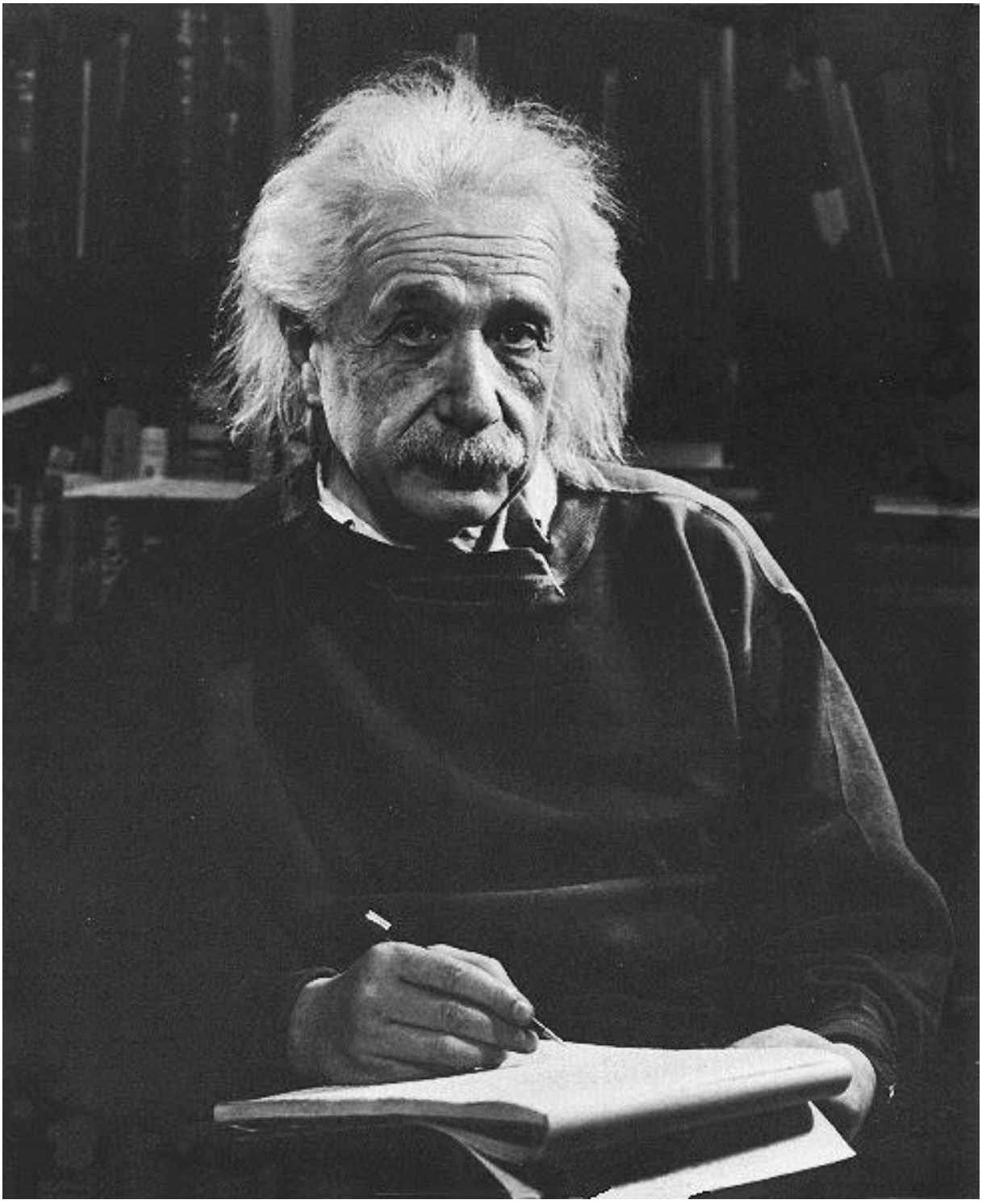
2 A) What is the max- and min- values for the image?

The max value is 0.6980 and the min value is 0.2902.

2 B) Histogram:

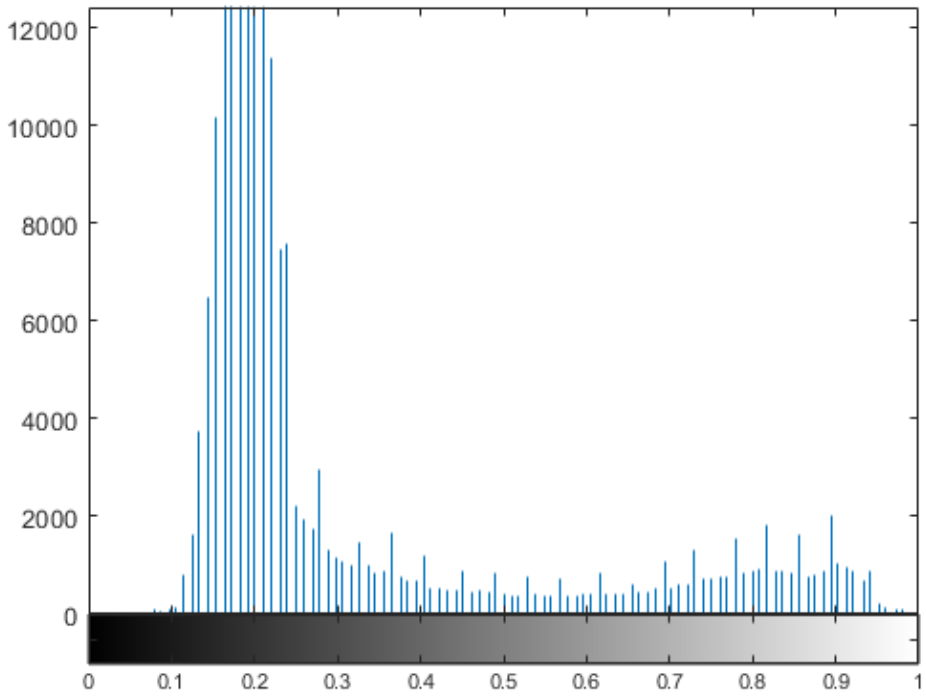


2 C) Resulting image after contrast stretching:



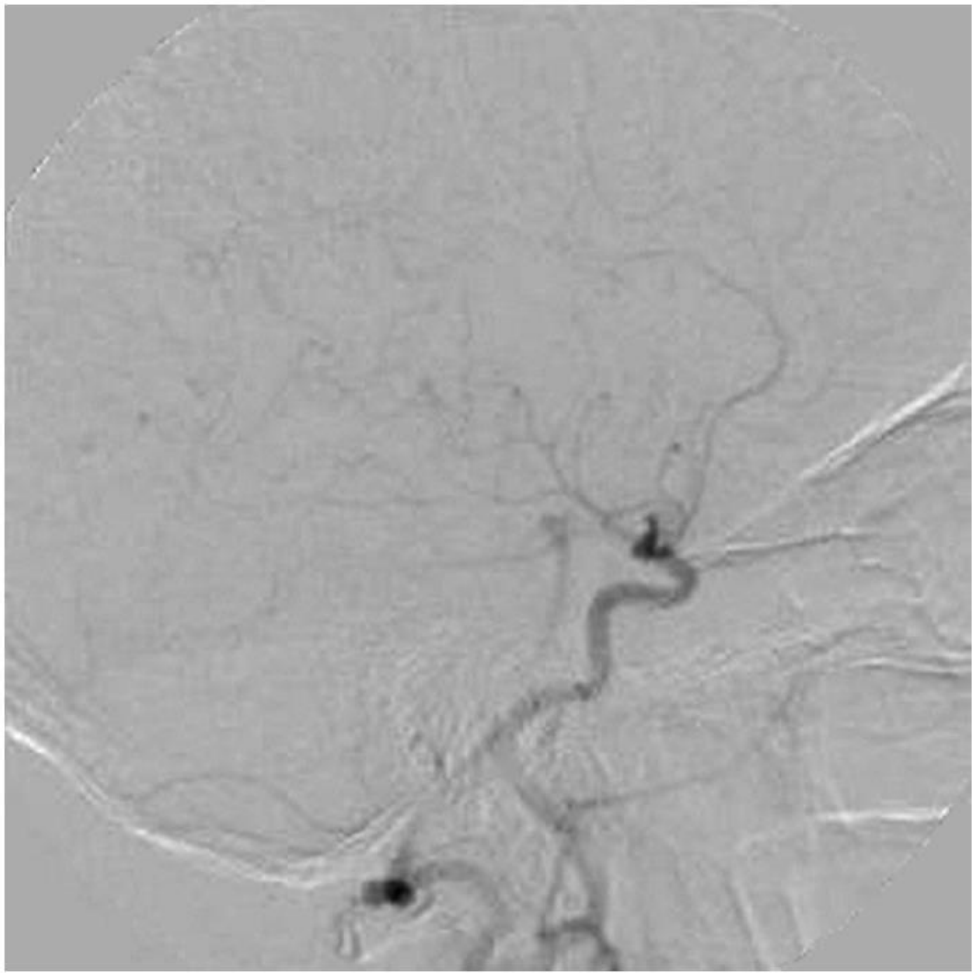
2 D) What will the max- and min- values be for the stretched image?
The max and min values will be 1 and 0 respectively, since the formula stretches each value to the min and max value.

2 E) Histogram for the stretched image:



3. Image subtraction

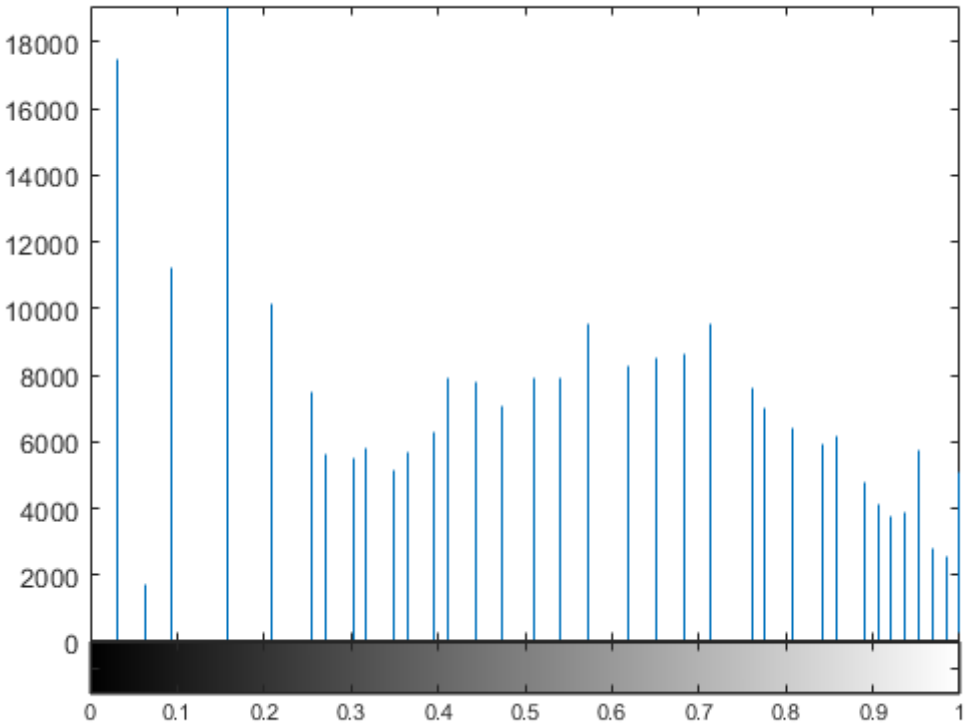
3 A) Enhanced difference image:



4. Histogram equalization

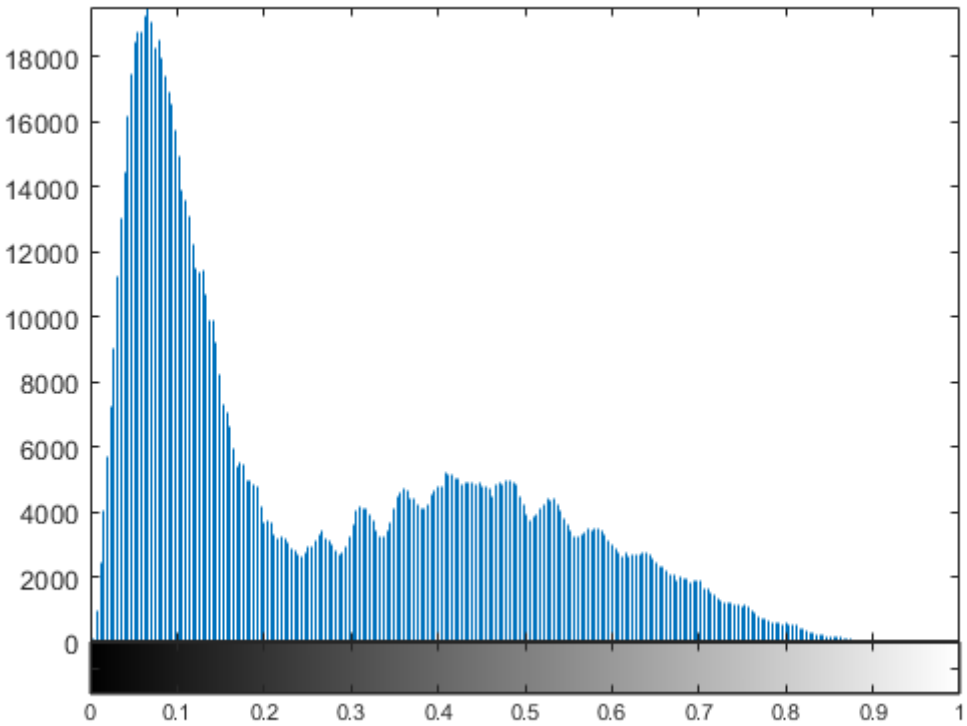
4 A) Equalized image:

4 B) Histogram for the equalized image:



5. Image division and shading correction

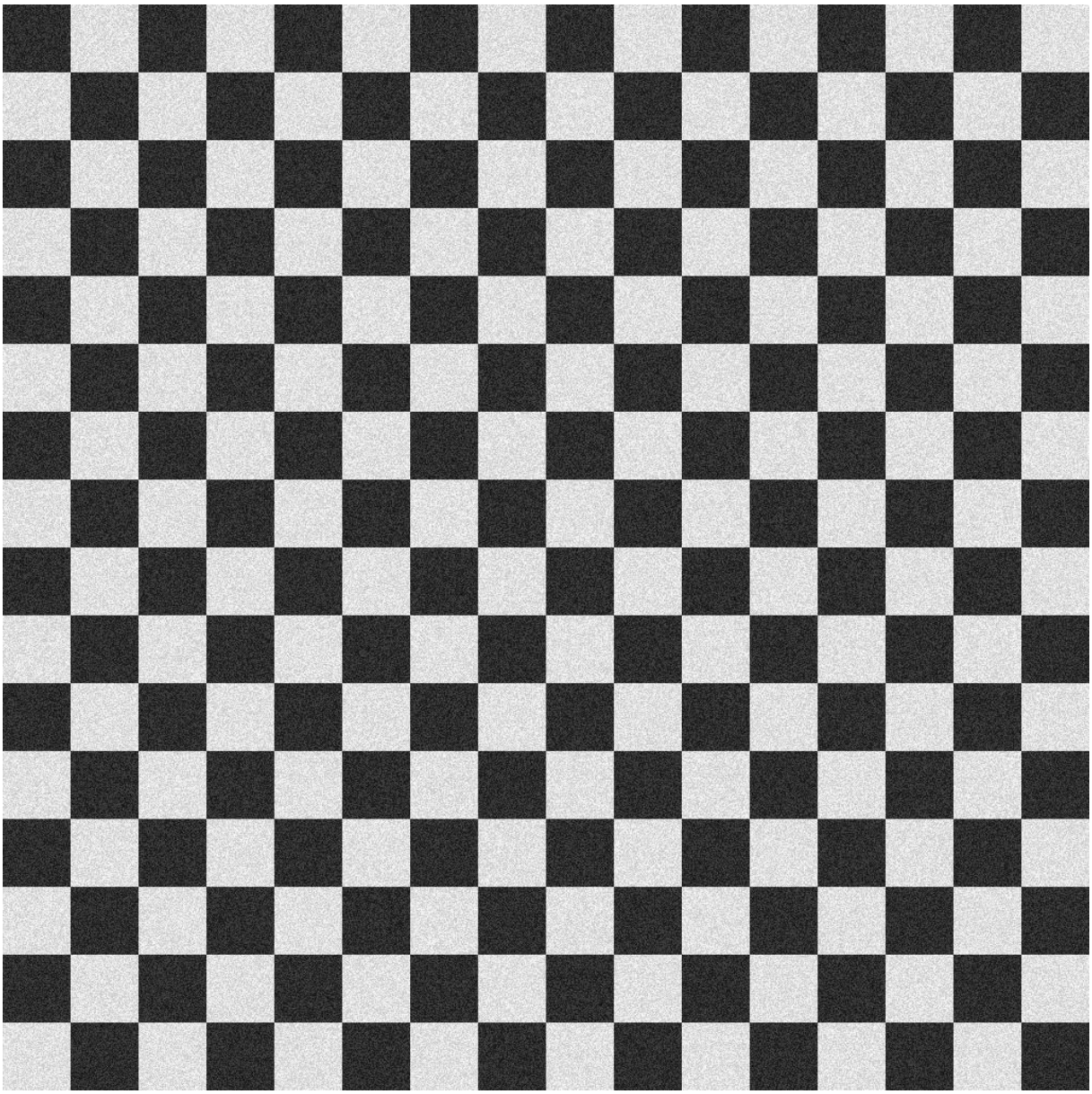
5 A) Histogram image:



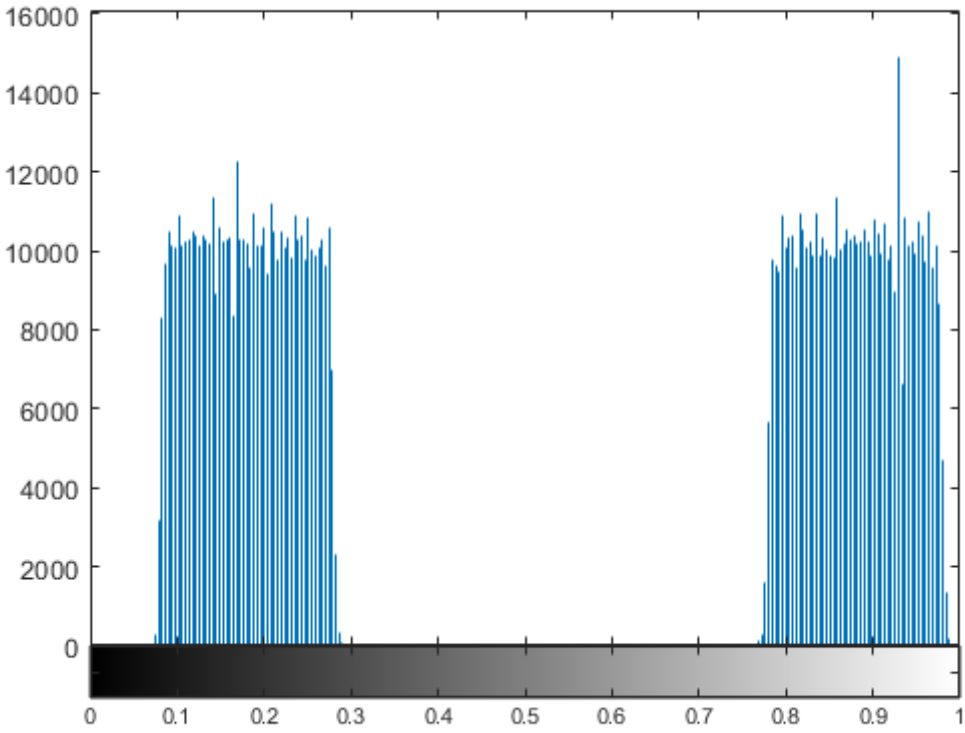
5 B) Is it possible to find a global threshold to segment this image (look at the histogram)?

No, since the histogram original image shows that there are no distinct values that separate black and white, nearly every shade of grey of grey is present in the histogram.

5 C) Recovered image:

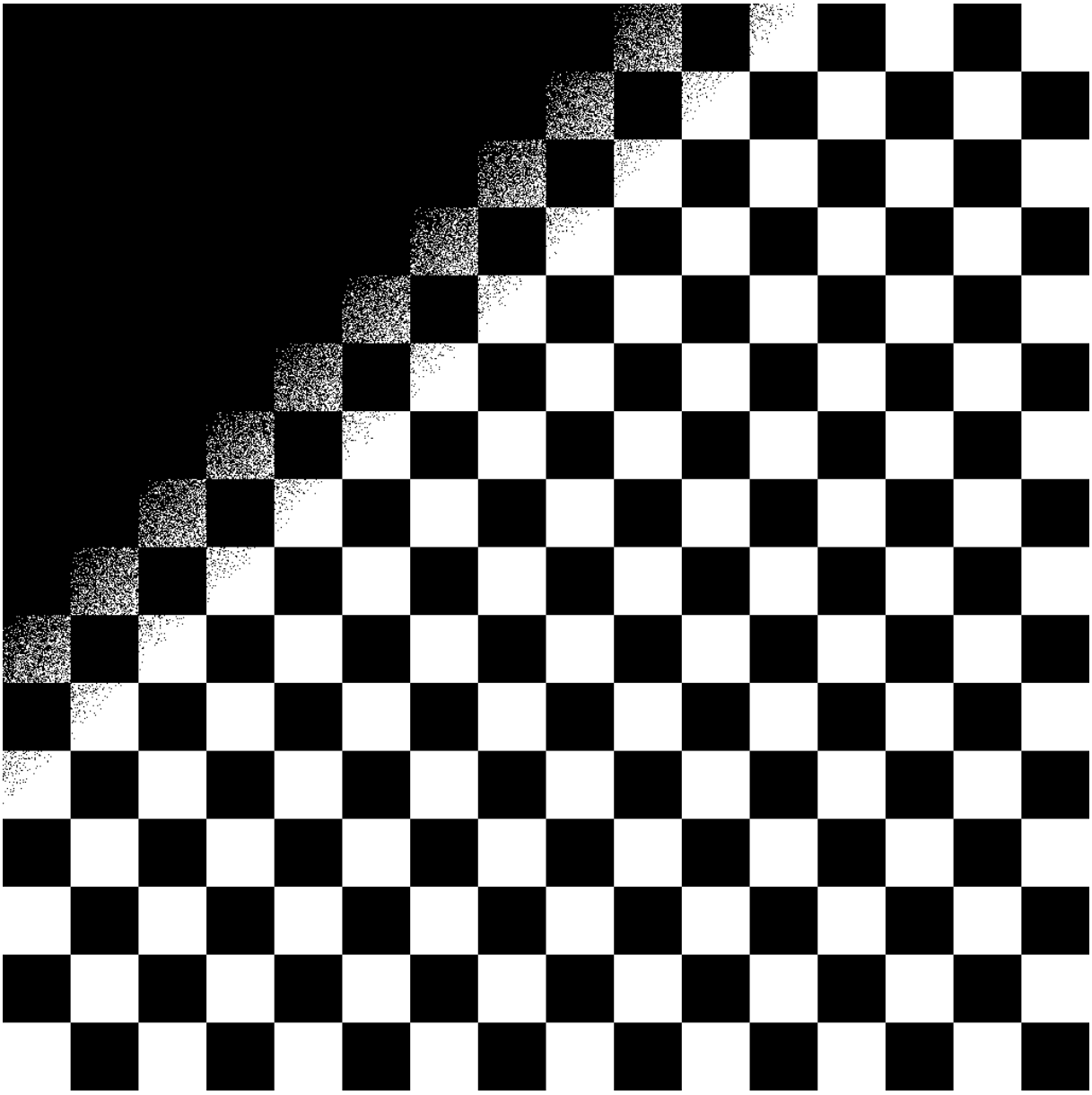


5 D) Histogram of recovered image:



5 E) Segmented image:

T = 0.3 gives



5 F) What is the data type (class) for the segmented image?

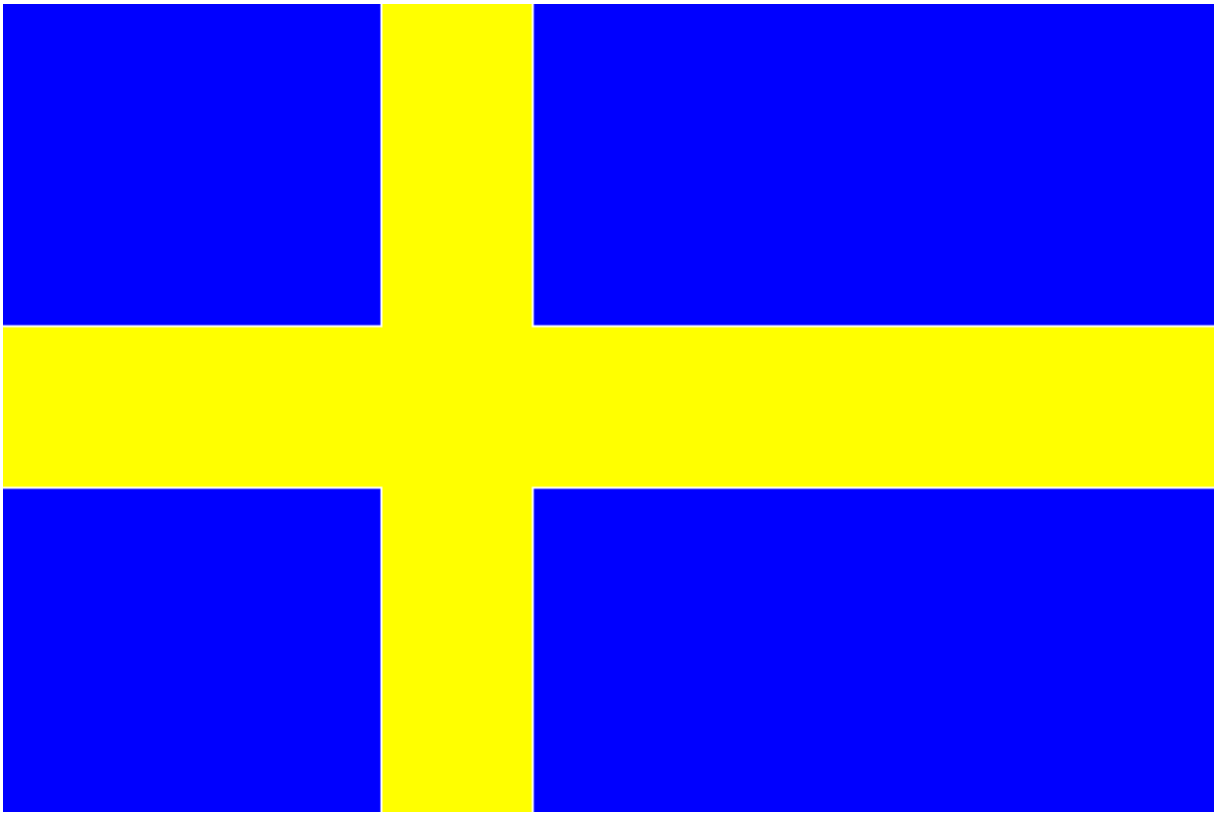
The segmented image is a stored as a 1024x1024 logical matrix, each value is represented as a 0 or a 1.

5 G) How many bits (per pixel) is required to store this type of image?

Each pixel uses 1 byte or 8 bit.

6. RGB-images and indexing

6 A) Image of Swedish flag:



Save the document as .pdf before submitting!