

Assignment 2

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Lesson: Image Processing & analysis

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1 Exercise 1

The function is a step function that increases the output values by a variable amount with step 30. The minimum inten-

sity is 10 and the maximum is 200 which is less than the input range on both ends. This should generally dim the image to some degree. Let us compare this function to one that does not alter the image.

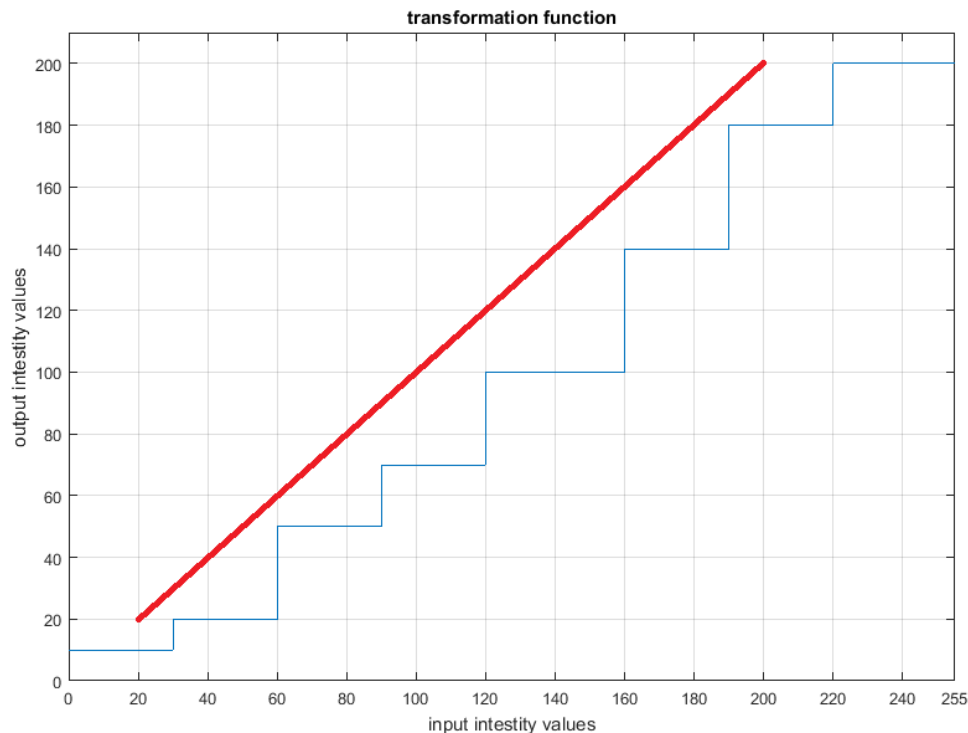


Figure 1: Comparison of the given function to one that does not alter the image (in red)

Here we can see the dimming effect considering the step function is *almost* always under the $y = x$ function that does not alter the image.

Since the function assigns an input range to a singular value we can expect some quantization of the output images. This should leave the output looking like a

lower quality image and it will also be easier to compress but it will also be the same resolution right after the transformation.

1.1 Example

You can find the files that perform this transformation [here](#).

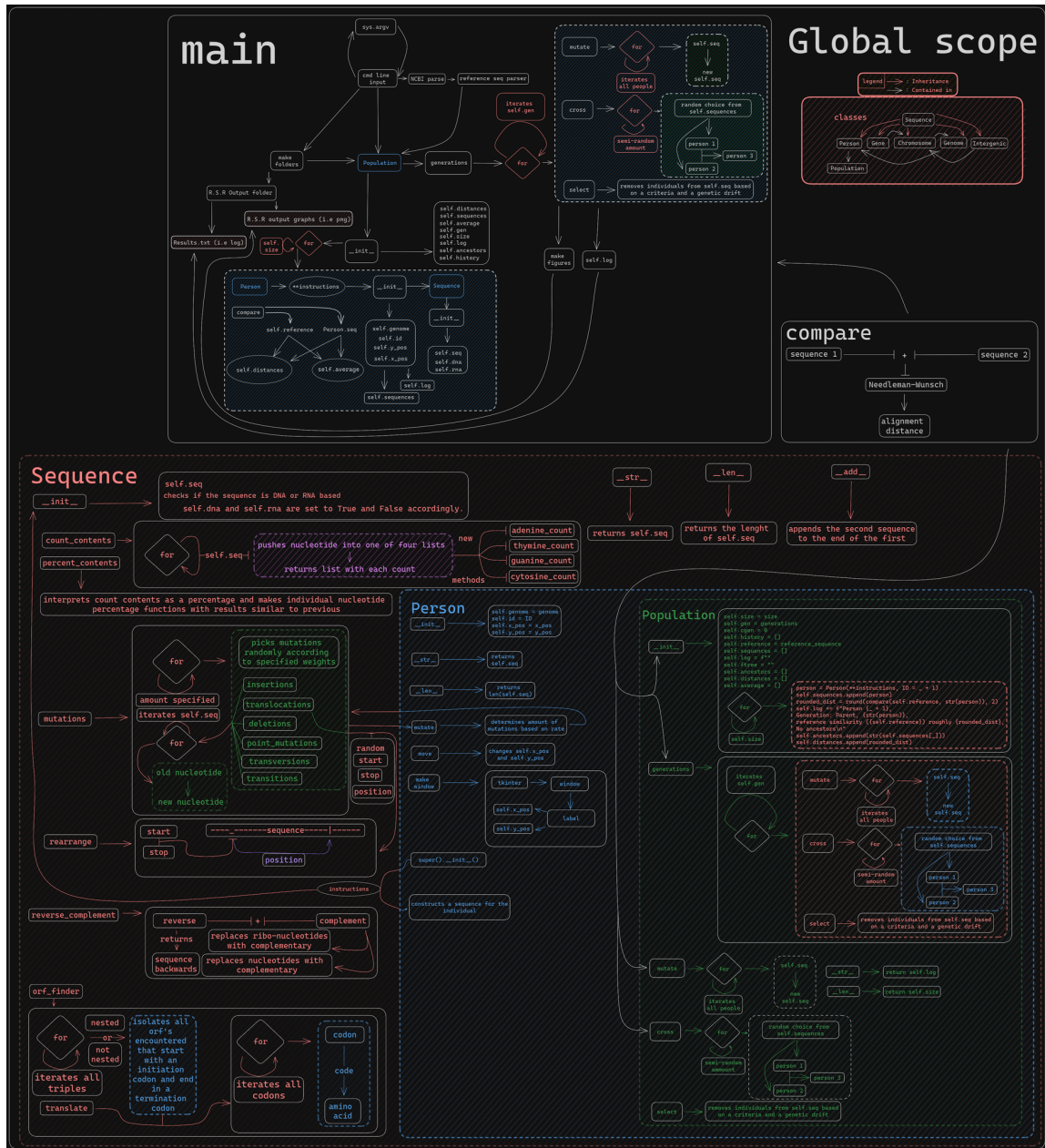


Figure 2: Our image before the transformation

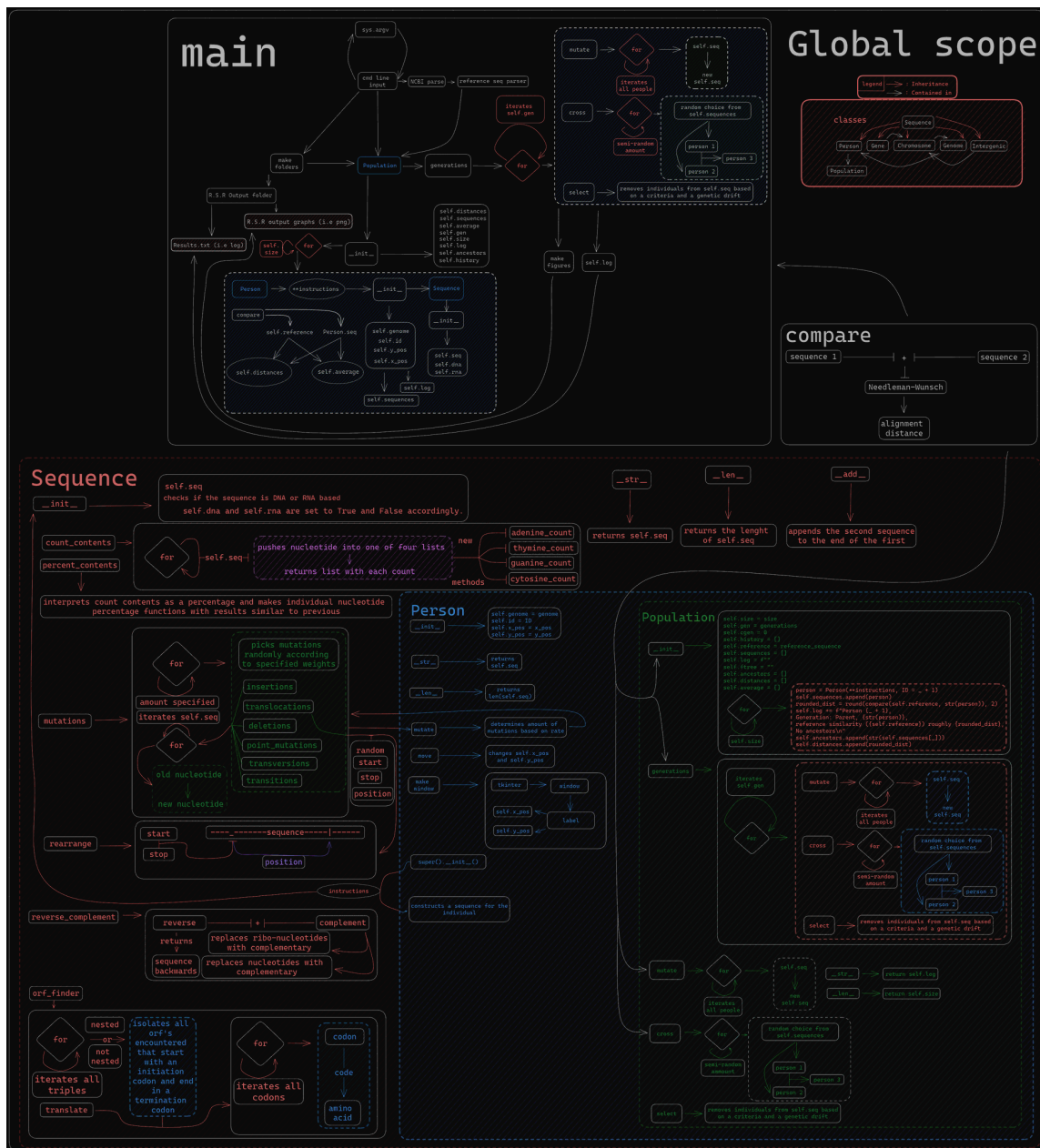


Figure 3: Image after the transformation

Table 1: Comparison of Images

Image	File Size (disk)	Shape
Before	3.29 MB	1861 × 2048
After	652 KB	1861 × 2048

2 Exercise 2

We can see the quantization into a lower quality image while maintaining the same dimensions but a much lower disk space.

The requirement says "a method" implying one but multiple transformations can be assigned to one method.



Table 2: Method Proposals

Method	Goal

3 Exercise 3

The requirement says "a method" implying one but multiple transformations can be assigned to one method.

Table 3: Method Proposals

Method	Goal

4 Exercise 4

5 Exercise 5

Lets look at some of the descriptive values for both images with our visual overview

Table 4: Comparison of Image_1 and Image_2

Image	Size
Image_1	800×641
Image_2	800×641

Visually it seems like we have just taken the negative of the image and since the scale of the image and the what side the aspects of the image are on has not changed we can assume a negative transformation has occurred. Upon zooming in we can see that Image_2 has some quality nuance, but we can simply examine Image_1 to see that it has this effect as well.

So the steps taken are those of getting the negative of an image which is to:

$$f(x) = 255 - x$$

In order to do the opposite we need a function (let's call it $g(x)$) such that:

$$\begin{aligned} g(f(x)) = x &\iff g(255 - x) = x \iff \\ g(x) = f(x) &= 255 - x \end{aligned}$$

6 Exercise 6

7 Exercise 7