DSAA Assignment 4

Report

Problem 1

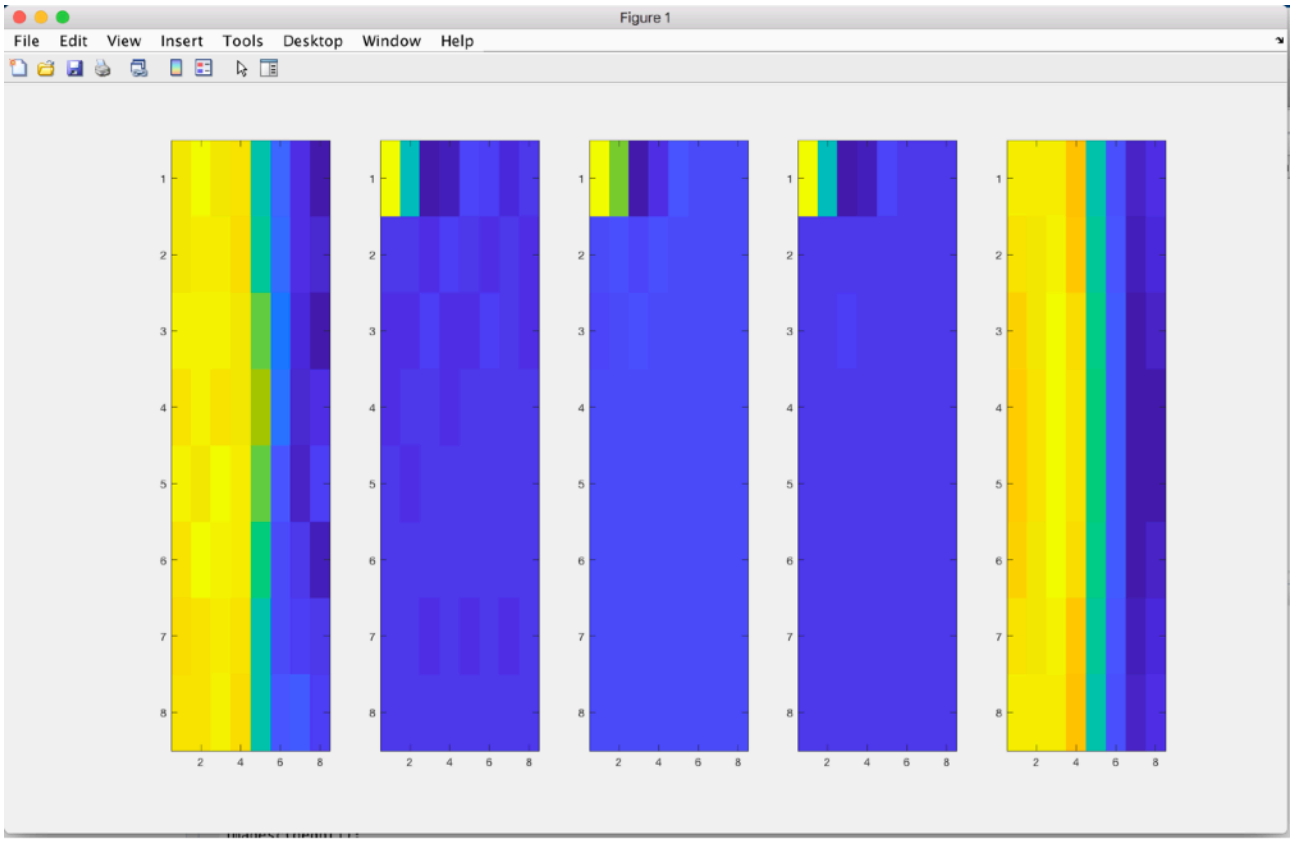
1) create_mat_dct()

Returns the dct matrix (default N=8)

```
>> F = create_mat_dct();
disp(F);
    0.3536    0.3536    0.3536    0.3536    0.3536    0.3536    0.3536    0.3536
    0.4904    0.4157    0.2778    0.0975   -0.0975   -0.2778   -0.4157   -0.4904
    0.4619    0.1913   -0.1913   -0.4619   -0.4619   -0.1913    0.1913    0.4619
    0.4157   -0.0975   -0.4904   -0.2778    0.2778    0.4904    0.0975   -0.4157
    0.3536   -0.3536   -0.3536    0.3536    0.3536   -0.3536   -0.3536    0.3536
    0.2778   -0.4904    0.0975    0.4157   -0.4157   -0.0975    0.4904   -0.2778
    0.1913   -0.4619    0.4619   -0.1913   -0.1913    0.4619   -0.4619    0.1913
    0.0975   -0.2778    0.4157   -0.4904    0.4904   -0.4157    0.2778   -0.0975
```

All other functions implemented, used in subsequent questions.

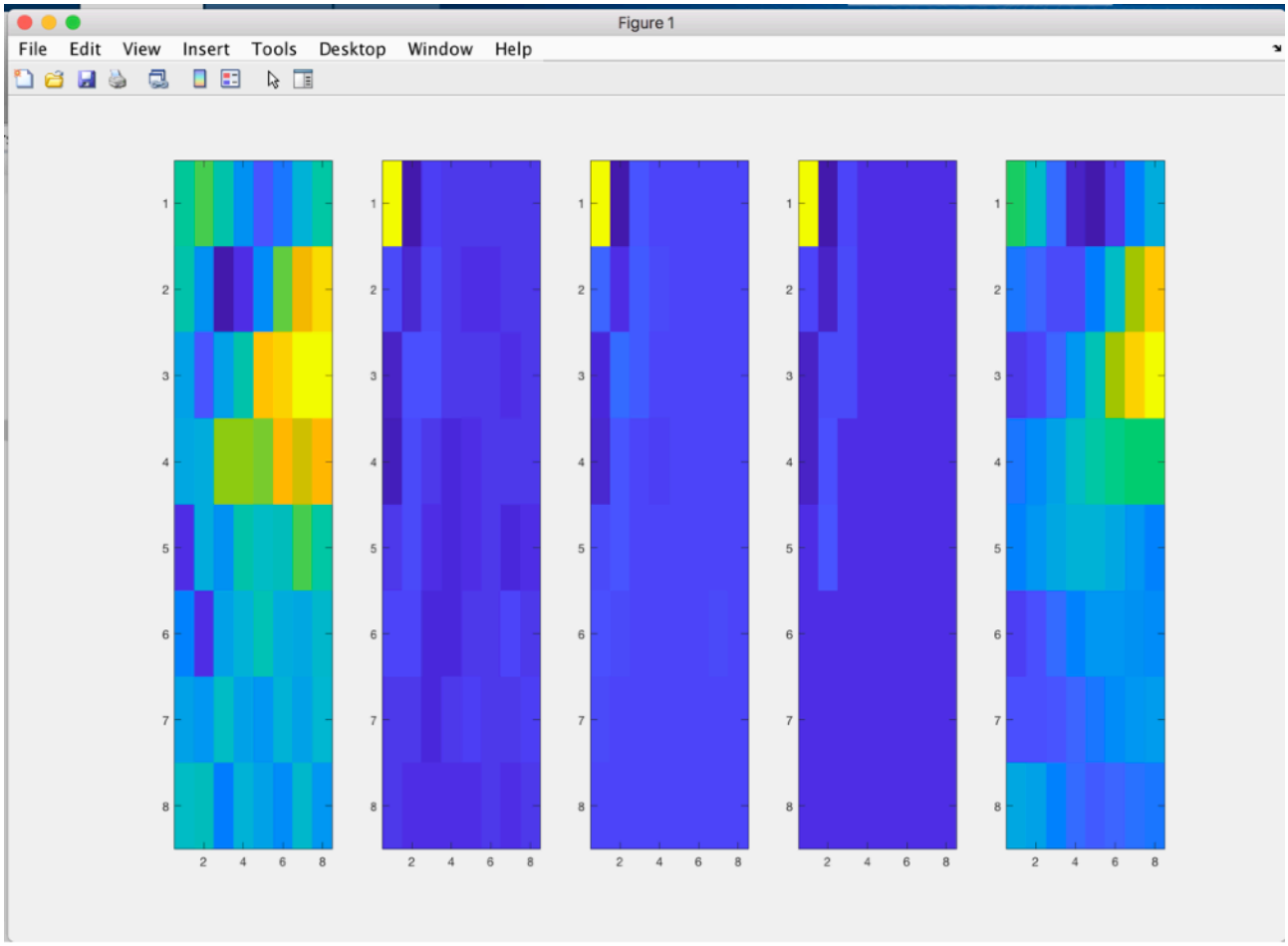
2) (420, 45)



Columns from left to right are:
original, dct image, quantized, dequantized, reconstructed.

As we can see, the reconstructed and original image are pretty much the same. That is because there is a lot of variation between the values of the pixels.

(427, 298)



Here, there is lesser variation between values of the pixels. So after quantization, lesser number of non-zero values are present. Image reconstruction isn't very perfect.

(30,230)

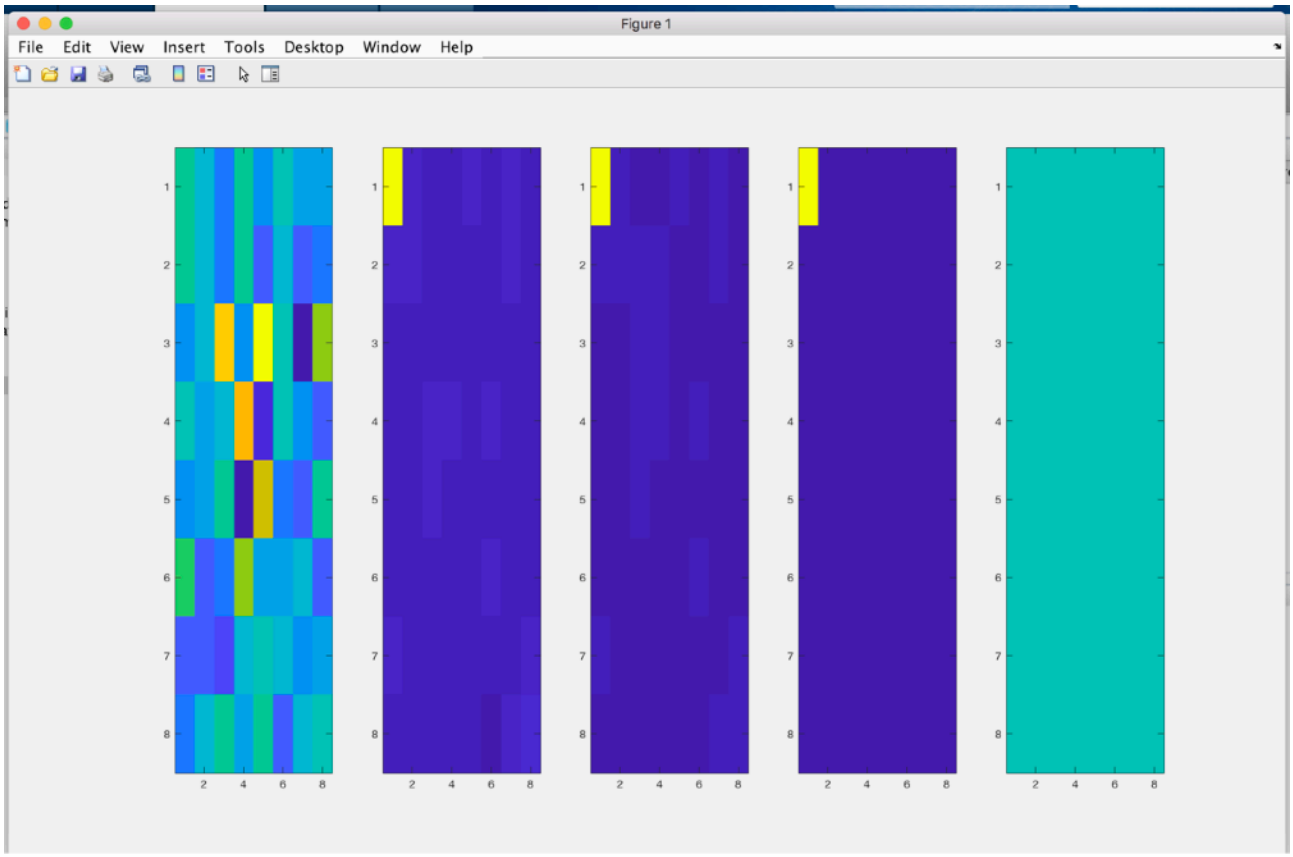
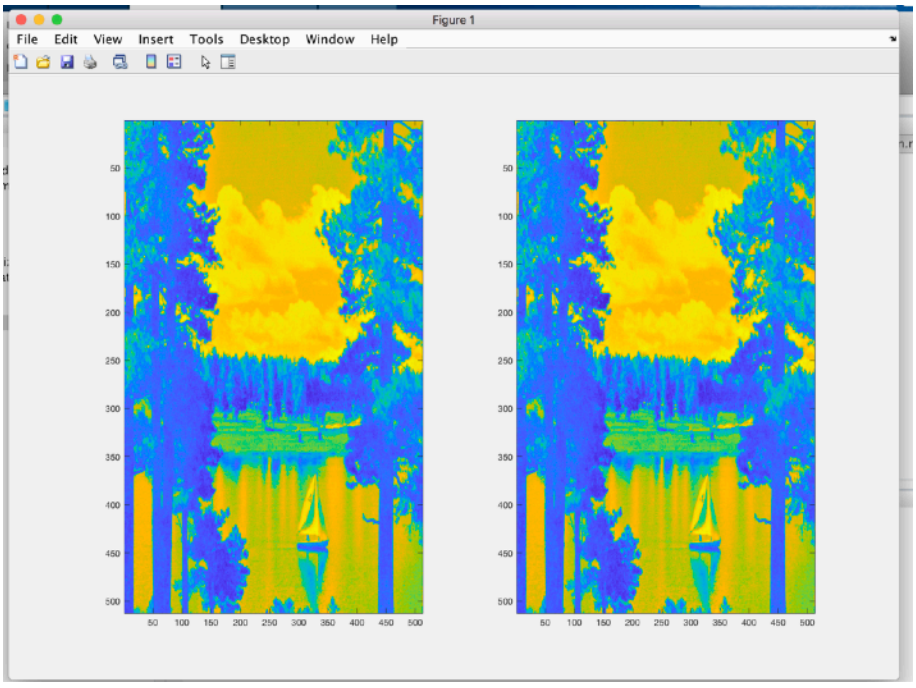


Image barely even got reconstructed!!!
Because the variations in the pixel values are really small, so quantisation leads to a significant loss of information.

3) This is at c=2
To all the 8x8 sub windows



It looks almost the same!!!
We notice that the image is almost perfectly reconstructed after compression.

4) Which is the best value for c?

As the value of c is increased, the image becomes more blurred. Like it becomes more pixelated. A lower value of c is therefore, definitely better.
Error and entropy increase as value of c increases!!
As we saw in last case, c=2 was reconstructing the image pretty well!

At c=10, the error value is high (~14)
And entropy value is also pretty high (~0.01)
Lots of pixelation at this value of c, not a good reconstruction image.