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DSAA - ASSIGNMENT 4

Compression and Principal Component Analysis

QUESTION 1

PART 1

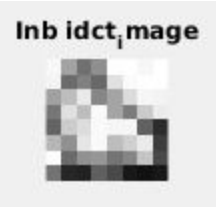
a.)

First i create a matrix of u*v , then cos of that , multiplied by sqrt(2/N) , then only the first row divided by sqrt(1/2). The matrices come out to be equal

b.)

DCT = F*image;

c.)



IDCT = INV(F)*IMAGE;

d.) Quantization is the process of reducing the number of bits needed to store an integer value by reducing the precision of the integer. Given a matrix of DCT coefficients, we can generally reduce the precision of the coefficients more and more as we move away from the DC coefficient. This is because the farther away we are from the DC coefficient, the less the element contributes to the graphical image, and therefore, the less we care about maintaining rigorous precision in its value.

https://cs.stanford.edu/people/eroberts/courses/soco/projects/data-compression/lossy/jpeg/coeff.htm

f.) **RMSE :** Root mean square error . Denotes how much 2 images differ.

g.) Entropy is defined as -sum(p.*log2(p)), where p contains the normalized histogram counts returned from imhist.

PART 2

The original images

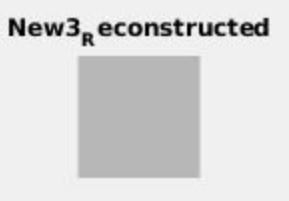
420,45 427,298 30,230

The DCT's of images

The Quantised DCT's of images

Upon quantisation most of the image blackens out. Meaning only the dc part remainsx.

The Reconstructed Images

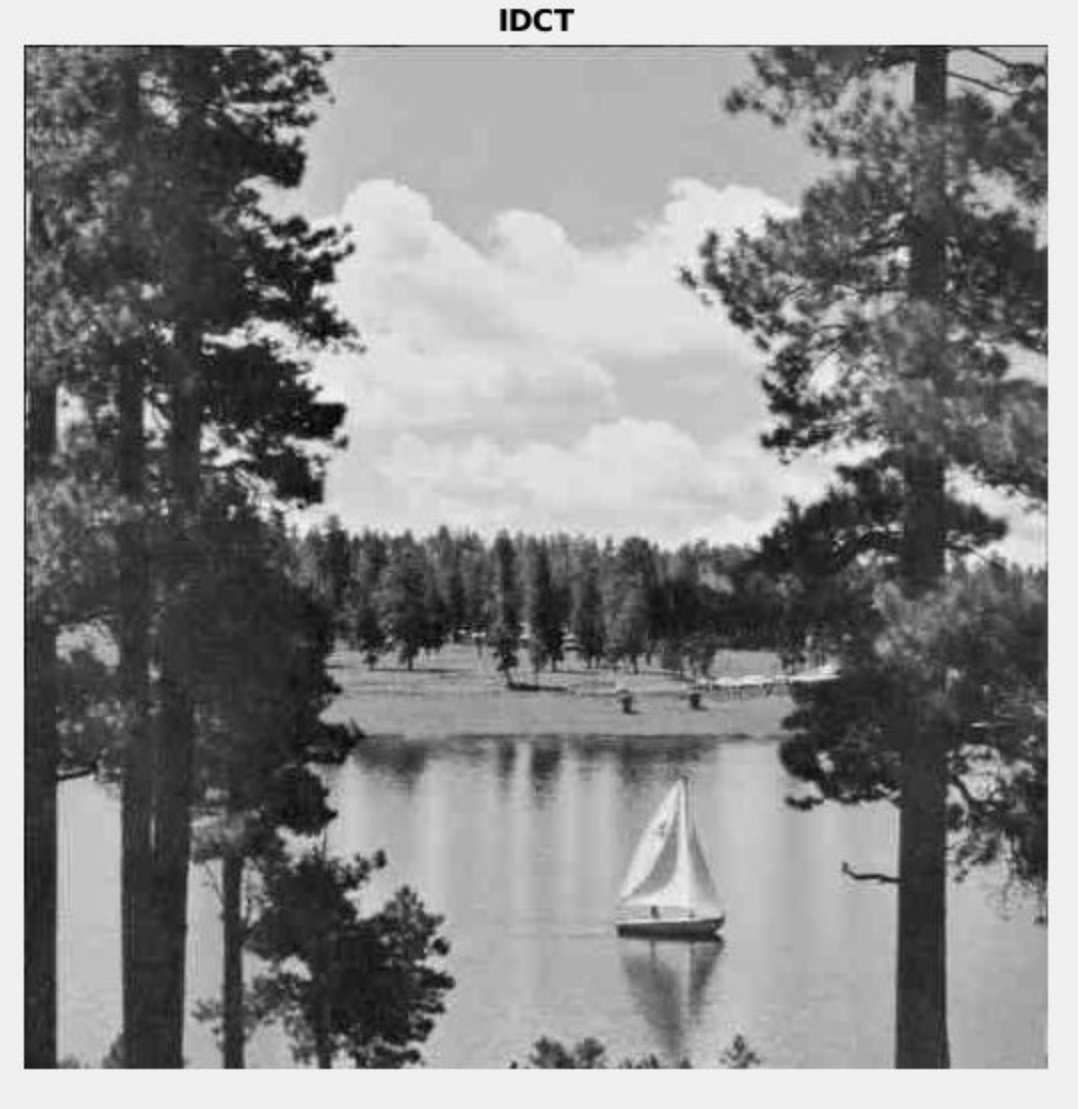


We can see that all images initially having almost similar distribution , finally leads to same reconstruction . Also we can see that the data is lost in the process. Hence lossy compression.

PART 3

PART 4

c =10 ;



c = 2;

As c increases the boundaries start to fade away. This is due to the larger compression. And many of the areas blacking out.