Assignment 3

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1. **Mean Square Error for KLT transform:**

KLT basis images calculated from SET 1

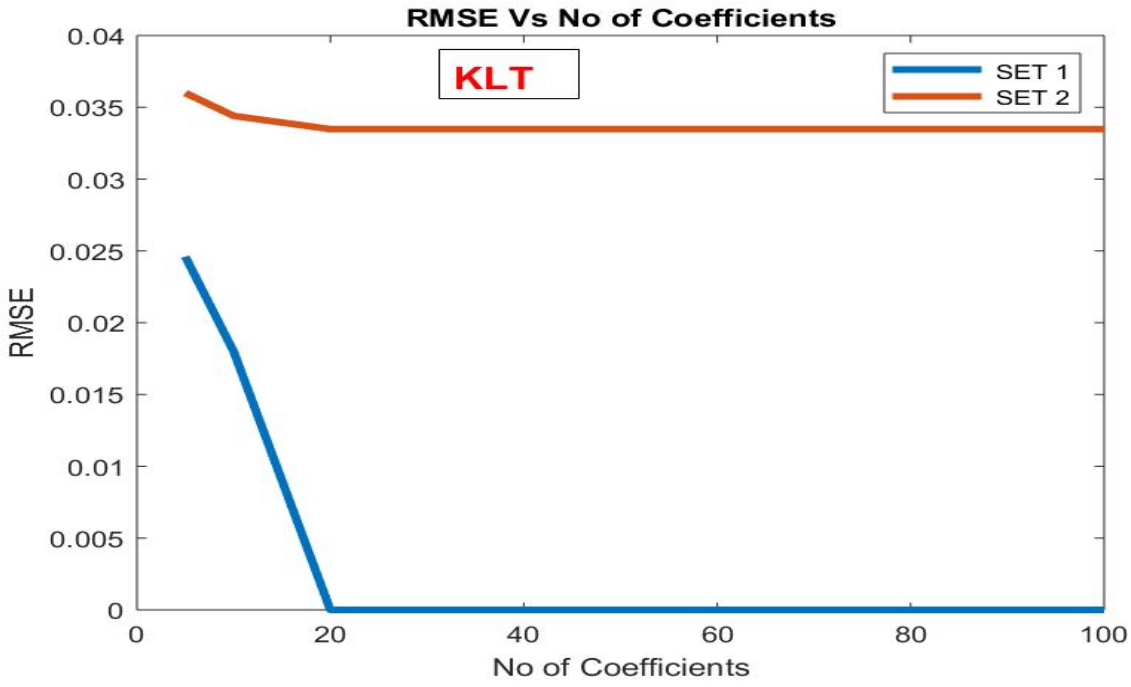
No of Coefficient	5	10	20	100
RMSE for SET 1	0.0246	0.018	$9.32 \times 10^{-08} = 0$	0
RMSE for SET 2	0.036	0.0344	0.03348	Assuming same error

Image_reconstruct = a matrix of 19200 X 20
Original_Image = a matrix of 19200 X 20

MSE calculation =

$$\left(\left(\sum\sum (\text{image\_reconstruct}[i,j] - \text{original\_image}[i,j])^2 / \text{no of pixels} \right)^{(0.5)} \right) / \text{(no of images)}$$

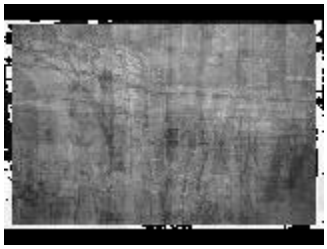
Graph:



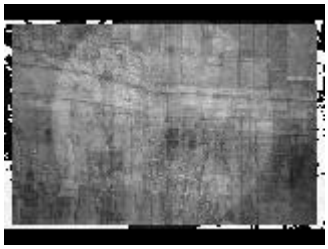
SET 1

Original Image:

Reconstructed Images:



No of Coefficient = 5



No of Coefficient = 10

No of Coefficient = 20

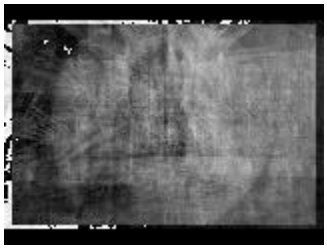
SET 2

Original Images:

Reconstructed Images: This is reconstructed using eigen vector of SET1

No of Coefficient = 5

No of Coefficient = 10

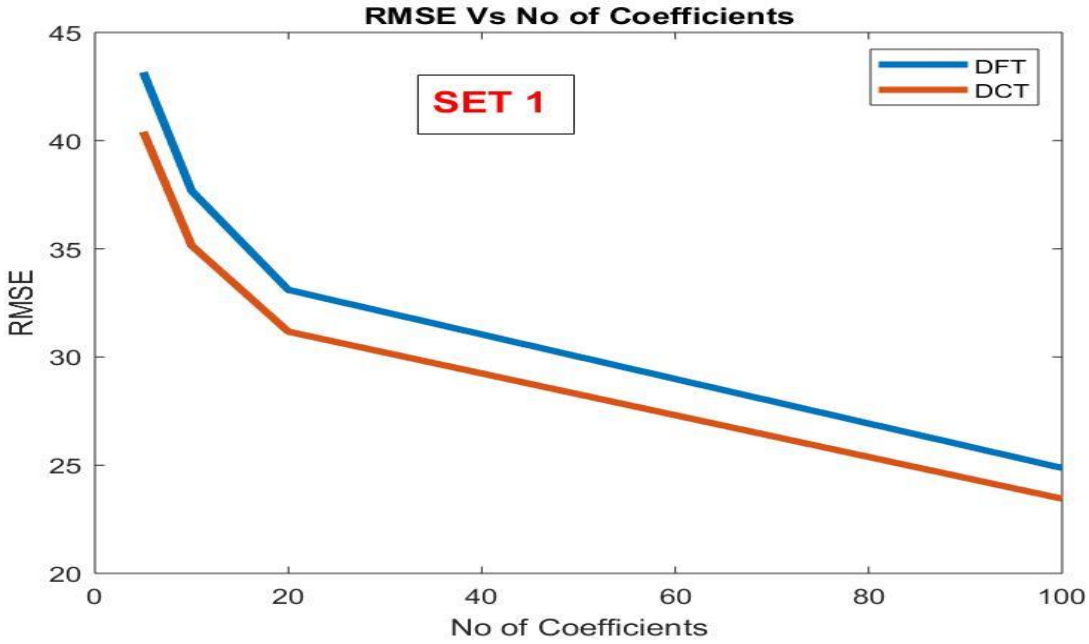


No of Coefficient = 20

2. DFT and DCT:

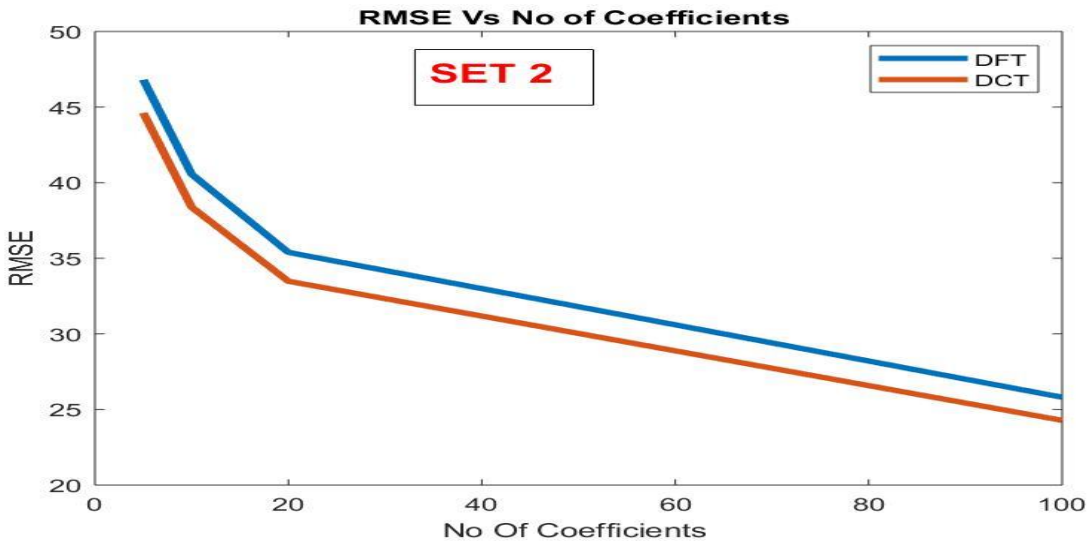
SET 1:

No of Coefficients	5	10	20	100
RMSE for KLT	0.0246	0.018	$9.322 * 10^{-08}$	0
RMSE for DFT	43.16	37.68	33.1	24.87
RMSE for DCT	40.41	35.15	31.17	23.45



SET 2:

No of Coefficients	5	10	20	100
RMSE for KLT	0.036	0.0344	0.3348	Assuming same
RMSE for DFT	46.81	40.56	35.39	25.81
RMSE for DCT	44.615	38.38	33.48	24.28



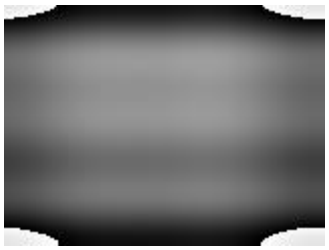
DFT:

SET 1:

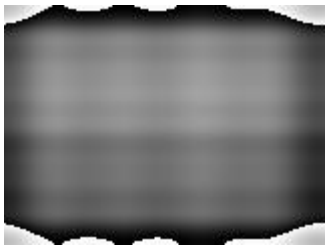
Original Image:

Reconstructed Images:

No of Coefficient = 5



No of Coefficient = 10



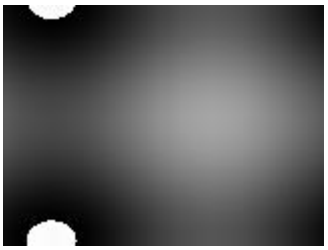
No of Coefficient = 20

No of Coefficient = 100

SET 2:

Original Image:

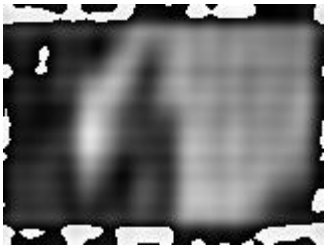
Reconstructed Images:



No of Coefficient = 5

No of Coefficient = 10

No of Coefficient = 20



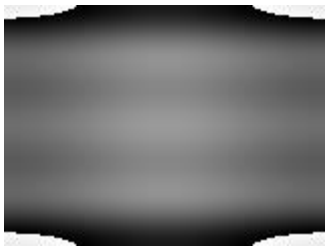
No of Coefficient = 100

DCT:

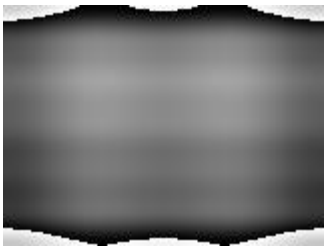
SET 1:

Original Image:

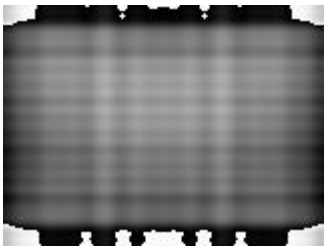
Reconstructed Images:



No of Coefficient = 5



No of Coefficient = 10



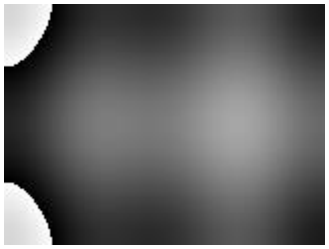
No of Coefficient = 20

No of Coefficient = 100

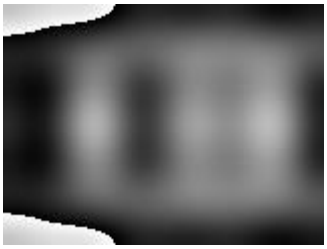
SET 2:

Original Image:

Reconstructed Images:



No of Coefficient = 5



No of Coefficient = 10

No of Coefficient = 20

No of Coefficient = 100

Guide to Run Code:

You need to define a path to save your reconstructed images:

For klt.py

Create directory in your computer

./hw3_imgs/reconstructed_set/klt/set_1/

./hw3_imgs/reconstructed_set/klt/set_2/

For dft.py

Create this directory in your computer

./hw3_imgs/reconstructed_set/dft/set_1/

./hw3_imgs/reconstructed_set/dct/set_1