Optional Homework: DCT

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Describe:

1. MATLAB file: main.m
    In this code, I input an image from AR database after resizing it to 160-by-120 and the compress ratio which decides the percentage of low frequency information remained. Then run the function to get compressed image. Finally display the original image and the compressed one.
2. MATLAB file: dctcompress.m
    This is the function whose input is a grayscale image and the compress ratio and output compressed image. It has several steps
    1. Get DCT matrix A for transform for 8*8 block.
    2. Show 64 DCT basis functions B.
    3. Get 64 coordinates in order of frequency of the information in the block.
    4. DCT transform.
    5. Use coordinates and compress ratio to make a mask to compress the information.
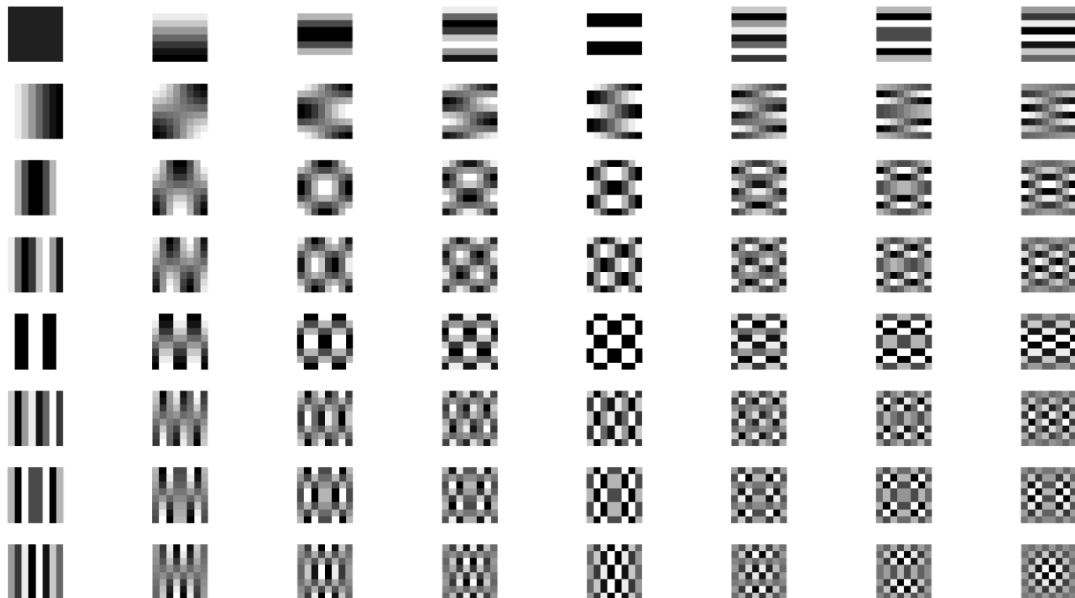   6. Inverse DCT transform.

Result:

Fig.1 64 basis functions

Horizontal frequencies increase from left to right, and vertical frequencies increase from top to bottom. Note that the upper left one is a matrix with all $0.125 = \frac{1}{\sqrt{8}} * \frac{1}{\sqrt{8}}$ value.

Fig.2 Compress ratio=0.1

Fig.3 Compress ratio=0.03