# ESTIN

# Pattern recognition for image analysis

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LAB ° 04

## Exercise 1

- Perform 2 DFT on a test image of your choice.
- Display the magnitude of the DFT image with and without shifting and with and without logarithmic mapping, to see the effect of shifting and logarithmic mapping. Visualise the image of the phase.
- Perform inverse DFT.
- Now, apply the inverse Fourier transform on the phase information only (without using the frequency informations).

- Apply the inverse Fourier transform on the frequency informations only (without the phase).
- Comment your results
- Modify the Fourier transform of the image to
  - ✓ keep only low frequencies,
  - ✓ keep only high frequencies.
- Apply the inverse Fourier transform on both and comment

## Exercise 2

1- Create an $8 \times 8$ image named **F** and display it.

2- Write a function to compute the discrete Cosine transform (DCT) matrix **A** which consists of DCT basic vectors (using python). The function should take as input, the number of basis vectors N and return as output the corresponding DCT matrix **A** ($N \times N$).

3- Call the function in (2) for $N = 8$ to generate a DCT transform matrix **A.** Compute the 2D forward DCT of the image **F** using matrix based transforms ($T = AFA^t$) and the 2D inverse DCT of $T(F' = A^tFA)$. Display T and $F'$.

4- Write a function to compute the basis images for discrete Cosine transform (DCT).The function should take a $N \times N$ size as input, and return as output the corresponding $(N \times N)$ basis images, each of size $N \times N$.
5- Call the function in (4) with size $8 \times 8$. Display all the 64 basis images.
6- Compute the 2D inverse DCT of T (computed above) using basis images. Display the result.

## Exercise 3