Università degli Studi di Brescia

Multimedia Communication Services
Lab experience n. 7

Block Transforms

Load a natural image and perform the following operations:

- Estimate the correlation matrix of 8×8 blocks (expanded as vectors in 64 dimensions) and compute the Karhunen-Loève transformation matrix
- Display the basis function of the obtained Karhunen-Loève transform (KLT) in decreasing order of importance depending on the associated eigenvalue (display each function as an 8×8 block)
- Apply the transform to the original image and "display" the result, studying how the energy is distributed over the transform coefficients.
- Apply a 2-dimensional DFT and a 2-dimensional DCT transforms, with 8×8 blocks, to the same image. Display the result and compare the energy distribution with the previous case
- Invert the transforms by only using the most significant coefficients of each block. Compute the energy of the reconstruction error and, for the KLT, compare with the transform eigenvalues.

[Bonus] Compute the separable KLT with 8×8 blocks and compare its performance with the non-separable KLT and with the DCT.