Università degli Studi di Brescia, Facoltà di Ingegneria

Multimedia Communication Services, A.Y. 2012/2013

13/11/2012 - Lab. experience n.6

Optimal prediction filter

Load an image and compute the autocorrelation of the luminance component. Consider then the linear predictor

$$I(x,y) = a_{10}I(x-1,y) + a_{01}I(x,y-1) + a_{11}I(x-1,y-1) + e(x,y)$$

- Compute the coefficients of the optimal predictor, compute the predicted image value in each pixel and display the so obtained image.
- Display the prediction error. Compute its power and compute and display its autocorrelation.
- Compute the prediction using the sub-optimal coefficients $a'_{10} = \frac{1}{3}, a'_{01} = \frac{1}{3}, a'_{11} = \frac{1}{3}$. Compare the power and the autocorrelation of the prediction error with the ones of the previous point.
- Create a synthetic image (for example, the product of two sinusoids), compute the prediction of this image using both the optimal sets of coefficients (for this signal!) and the coefficients $[\frac{1}{3}, \frac{1}{3}, \frac{1}{3}]$. Compare the results and discuss the different result obtained with respect to the case of a natural image.