

Course description

Name of course: Wavelets and filter banks - image processing
Credits: 4
Hours/week: 3
Type: practice
Topics: <ol style="list-style-type: none">1. Introduction – Fourier Transform and Wavelet Transform – short overview2. Haar wavelet3. Lowpass filter -Highpass filter4. Filter Bank (FB); The Analysis and the Synthesis Bank;5. Downsampling and Upsampling; Matrices for downsampling and upsampling;6. Subsampling in the frequency domain; Sampling operations in the z-domain; Scaling functions and wavelets;7. Discret Wavelet Transform (DWT) and Fast Wavelet Transform (FWT);8. The Haar coefficients; Application: a FB with two channels;9. Perfect reconstruction; Spectral Factorization;10.-11. Orthogonal filter banks; Halfband filters;12, Maxflat (Daubechies) filters; Biorthogonal wavelets;13. Image compression; Distortion in image compression;
Literature: <p>G. Strang, and T. Nguyen, Wavelets and Filter Banks, Wellesley-Cambridge Press:Wellesley, MA (1996)</p>
Recommended literature: <ol style="list-style-type: none">1. R. M. Rao, A. S. Bopardikar, "Wavelet transforms: introduction to theory and applications," Addison-Wesley: Reading, MA (1998)2. M. Vetterli, and J. Kovacevic, "Wavelets and subband coding," Prentice Hall: New Jersey (1995)3. C. S. Burrus, R. A. Gopinath, H. Guo, "Introduction to wavelets and wavelet transforms, a primer," Prentice Hall: New Jersey (1998)