LEHRSTUHL FÜR MENSCH-MASCHINE-KOMMUNIKATION

Pattern Recognition

Tutorial No. 3
23.05.2014

Exercise 7

Show, that the DC-component of the Mexican-Hat-Wavelet below equals zero.

$$\psi(t) = \left(1 - \frac{t^2}{\sigma^2}\right) \cdot \exp\left(-\frac{t^2}{2\sigma^2}\right)$$

Exercise 8

The wavelet-transform can be expressed as a convolution of the original function y(t) and the scaled wavelet-function Ψ(t/c). Compute the effect of the scaling-factor c on the spectral features of the function Ψ.

Exercise 9

Examine the spectral features of the Mexican-Hat-Wavelet Ψ from exercise 7) by transforming it into the spectral domain. Has Ψ the characteristics of a bandpass ? How do the spectral features change with a variable **c**, like in exercise 8) ?

Exercise 10

Compute the wavelet-transform of the Dirac-impulse $\delta(t - \tau_0)$, using the Mexican-Hat-Wavelet. How does the absolute value of the transform, as a function of τ look like, using a constant c? Which form has the resulting scalogram?