Lecture 12, Wavelets

040511

GW 7, only briefly

\[ x(t) = \cos(2\pi \cdot 5 \cdot t) + \cos(2\pi \cdot 10 \cdot t) + \cos(2\pi \cdot 20 \cdot t) + \cos(2\pi \cdot 50 \cdot t) \]

Taken from http://users.rowan.edu/~polikar/WAVELETS/WTutorial.html

Stationary signal

Non-stationary signal

FT cannot distinguish the two signals very well, i.e., FT, both signals are "the same", because they constitute of the same frequency components. Therefore, FT is not a suitable tool for analyzing non-stationary signals, i.e., signals with time varying spectra.

The continuous wavelet transform is defined as follows

\[ CW_T^\omega(\tau, s) = \Psi_T^2(\tau, s) = \frac{1}{\sqrt{s}} \int x(t) \psi_t^*(t - \tau) \, dt \]

The transformed signal is a function of two variables, \( \tau \) and \( s \), the translation and scale parameters, respectively. \( \psi(t) \) is the transforming function, and it is called the mother wavelet.
Example of wavelet transform for reduction of noise
Trying wavelets in Matlab

Start Matlab
Write wavemenu
Select Wavelet 2-D
Load an image from
/5/sw/m大气box/current/toolbox/wavelet/wavedemo*.mat
Experiment with different families, types and levels and results of
different compression levels.

Look at the families of wavelets by going to Display/Wavelet Display