Gabor Filters

Gabor Filters - Definition

- Gabor filters are band-pass filters which are used for feature extraction, and texture analysis.
- They are both directional and frequency-selective filters and has the optimal space frequency resolution, i.e. the best joint space-frequency localization.
- A Gabor filter is basically a Gaussian multiplied by a complex sinusoid. In 2D cases,

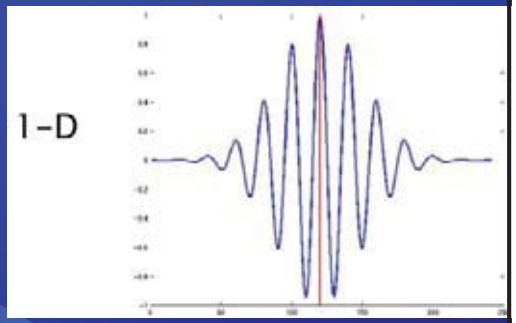
$$h(x,y) = g(x,y) \cdot s(x,y)$$

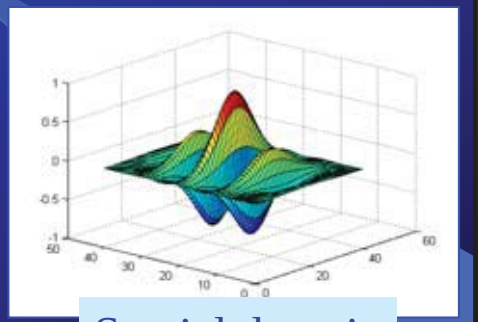
where,

$$g(x,y) = \frac{1}{2\pi\sigma_x\sigma_y}\exp\{-\frac{1}{2}[(\frac{x}{\sigma_x})^2 + (\frac{y}{\sigma_y})^2]\}$$

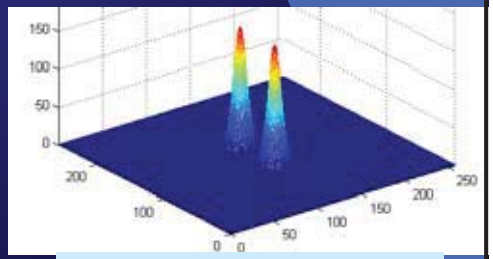
$$s(x,y) = \exp[-j2\pi(ux+vy)]$$

(u,v) are the 2D frequencies of the complex sinusoid, and its orientation is given by $\phi = \arctan(v/u)$





Spatial domain



Frequency domain