

# Laplacian Pyramid

2/20/08 (1)

$$P_{\text{Laplacian}}(\mathbf{I})_m = P_{\text{Gaussian}}(\mathbf{I})_m$$

Annotations:  
-  $P_{\text{Gaussian}}(\mathbf{I})_m$  is labeled "Gaussian Pyramid input image level"  
-  $m$  is labeled "m is the coarsest level"  
-  $P_{\text{Laplacian}}(\mathbf{I})_m$  is labeled "Laplacian pyramid"

$$P_{\text{Laplacian}}(\mathbf{I})_k = P_{\text{Gaussian}}(\mathbf{I})_k - \overset{\text{up sample}}{S^\uparrow} (P_{\text{Gaussian}}(\mathbf{I})_{k+1})$$

Annotations:  
-  $S^\uparrow$  is labeled "up sample"  
-  $P_{\text{Gaussian}}(\mathbf{I})_{k+1}$  is labeled "next finer level"

# Gabor Filter kernels

$$G_{\text{symmetric}}(x, y) = \underbrace{\cos(k_x x + k_y y)}_{\text{Fourier-like basis}} \underbrace{\exp\left(-\frac{x^2 + y^2}{2\sigma^2}\right)}_{\text{Gaussian}}$$

$$G_{\text{antisymmetric}}(x, y) = \underbrace{\sin(k_x x + k_y y)}_{\text{Fourier-like basis}} \underbrace{\exp\left(-\frac{x^2 + y^2}{2\sigma^2}\right)}_{\text{Gaussian}}$$

