Steps for Filtering in the Frequency Domain 1. Multiply the input image by (-1)x+y to center the transform 2. Compute F(u,v), the DFT of the image from 1. 3. Pixelwisely multiply F(u,v) by a filter function H(u,v). 4. Compute the inverse DFT of the result in 3. 5. Obtain the real part of the result in 4. 6. Multiply the result in 5 by (-1)^(x+y). **Low Pass** Filtered image has less sharp detail **High Pass** Have less gray level variations in smooth areas. Emphasize transitional gray level detail. **Ideal Low Pass** 1 if D(u,v) <= D0, 0 if D(u,v) > D0. **Ideal High Pass** reverse of low pass. **GLPF** H(u,v) = e^(-D^2(u,v)/2o^2) = e^(-D^2 (u,v)/(2*D0^2)). Dark outer smooth light inner. Larger variance = larger cutoff, milder filtering. No ringing. **Butterworth LP** Similar but ringing. **Why HP** Emphasizes edges in image. Low freq is lost. Hist EQ is needed. **Wavelet Coding** image pyramid. Decreasing resolution.**Gx** Horizontal Lines (-1,0,1;-2,0,2;-1,0,1) **Gy** Vertical Lines (-1,-2,-1;0,0,0;1,2,1) **Edge Hist** arctan(GA/GY) = angleA. |Gax| + |Gay| = magA **Spatial Domain HP** can contain neg, Sum of all parts = 0, symmetric. **LP** sum = 1, not symmetric **Transformation Function** log = expands out, power increases contrast **Strong laplacian** (-1,-1,-1;-1,8,-1;-1,-1,-1) **Weak Laplacian** (-1,-1,-1;-1,5,-1;-1,-1,-1). HP Filter, highlights edges. Deempasize slow changing areas **Sobel** Edge detection. Makes black and white. **Colors** Low pass white in middle Highpass is black in middle **Hist Eq** 1. Obtain Hist 2. Compute Cumulative Hs. H(1) = 5/125. 3. multiply by 255. 4. Lookup table to create new image **Thresholding** Used for binary image. **Functions**: fft2,fftshift,ifft2,ifftshift,rgb2gray,dwt2(image,'db2') returns ca,ch,cv,cd , wavedec2(image,levels,'db2') returns 2 values. Array and where array is split.