

Some Commonly Used Functions in Matlab Wavelet Toolbox

1. `wavemngr ('read',1)`

Show all wavelets in the matlab toolbox

2. `[C, S] = wavedec2(X,N,'wname')`

Performs a multilevel 2-D wavelet decomposition, returns the wavelet decomposition of the input image X at level N

X, input image

N, decomposition levels

C, decomposition vector $C = [A(N) \mid H(N) \mid V(N) \mid D(N) \mid H(N-1) \mid V(N-1) \mid D(N-1) \mid \dots \mid H(1) \mid V(1) \mid D(1)]$

A(N) , approximation coefficients at level N

H(N), horizontal detail coefficients at level N

V(N) , vertical detail coefficients at level N

D(N) , diagonal detail coefficients at level N

S, the size of the corresponding matrix

3. `A = appcoef2(C,S,'wname',N)`

Computes the approximation coefficients at level N using the wavelet decomposition structure [C, S] (see `wavedec2`)

C, decomposition vector in the command `wavedec2`

S, size of the corresponding decomposition vector

wname, the wavelet name, 'haar', 'db4', etc

N, decomposition level

A, approximation coefficients at level N

4. `D = detcoef2(O,C,S,N)`

Extracts horizontal, vertical or diagonal detail coefficients from the wavelet decomposition structure [C, S]

O, 'h': Extracts horizontal detail coefficients

O, 'v': Extracts vertical detail coefficients

O, 'd': Extracts diagonal detail coefficients
C, decomposition vector in the command wavedec2
S, size of the corresponding decomposition vector
N, decomposition level
D, detail coefficients

5. `X = waverec2(C,S,'wname')`

Performs a multilevel 2-D wavelet reconstruction

C, decomposition vector in the command wavedec2

S, size of the corresponding decomposition vector

wname, the wavelet name, 'haar', 'db4', etc

X, the reconstructed signal

Example:

```
x=imread('lena.jpg'); x=double(x);  
imshow(uint8(x)); % show the original image
```



X

```
[C, S] = wavedec2(x, 2, 'db4'); A1 = appcoef2(C, S, 'db4', 1);  
imshow(uint8(A1)); % show approximation coefficients at level 1
```



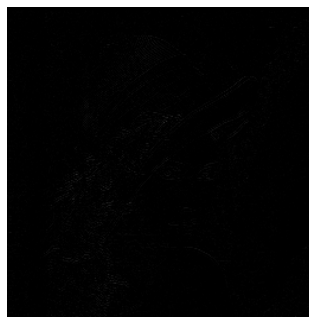
A1

```
A2 = appcoef2(C, S, 'db4', 2);
imshow(uint8(A2)); % show approximation coefficients at level 2
```

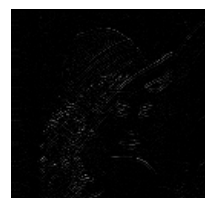


A2

```
h1 = detcoef2('h', C, S, 1); h2 = detcoef2('h', C, S, 2);
imshow(uint8(h1)); imshow(uint8(h2));
% show horizontal detail coefficients at level 1 and level 2
```



h1



h2

```
v1 = detcoef2('v', C, S, 1); v2 = detcoef2('v', C, S, 2);
imshow(uint8(v1)); imshow(uint8(v2));
% show vertical detail coefficients at level 1 and level 2
```



v1



v2

```
x=waverec2(C, S, 'db4'); % show the reconstructed image
```



x