

Wavelet denoising

```
In[6]:= im = Import["D:\\E\\Basam\\case1\\06070000\\35084532"];
```

```
In[7]:= noisy = ImageEffect[im, {"GaussianNoise", 0.098}];
```

```
In[8]:= wavelet = DiscreteWaveletTransform[noisy, BiorthogonalSplineWavelet[2, 8]]
```

```
Out[8]= DiscreteWaveletData[ Data dimensions: {512, 512}  
Refinements: 9]
```

```
In[4]:= SNR[s_, snoisy_] := 10 Log10[
$$\frac{\text{Variance}[s]}{\text{Variance}[(\text{snoisy} - s)]}$$
];
```

```
PSNR[s_, snoisy_] := 10 Log10[
$$\frac{\text{Max}[\text{Abs}[s]]^2}{\text{Variance}[(\text{snoisy} - s)]}$$
];
```

```
In[5]:= methods = {"Universal", "UniversalLevel", "VisuShrink",  
"VisuShrinkLevel", "SURELevel", "SUREShrink", "GCV", "GCVLevel",  
"SURE", "SmoothGarrote", "PiecewiseGarrote", "Hyperbola"};
```

```
In[16]:= invwav[th_] := InverseWaveletTransform[WaveletThreshold[wavelet, th]]
```

```
In[17]:= TableForm[  
Table[{th, SNR[im, invwav[th]], PSNR[im, invwav[th]], ImageDistance[im, invwav[th]]},  
{th, methods}], TableHeadings -> {None, {"method", SNR, PSNR, ImageDistance}}]
```

```
Out[17]//TableForm=
```

method	SNR	PSNR	ImageDistance
Universal	22.0974	30.3521	15.5479
UniversalLevel	11.9463	20.201	50.0746
VisuShrink	20.4249	28.6796	18.8545
VisuShrinkLevel	7.07103	15.3257	88.7776
SURELevel	18.5746	26.8293	23.3287
SUREShrink	20.4691	28.7238	18.7587
GCV	18.9781	27.2328	22.2655
GCVLevel	13.9188	22.1735	40.8966
SURE	22.0686	30.3233	15.5996
SmoothGarrote	21.9894	30.2441	15.7423
PiecewiseGarrote	22.8167	31.0714	14.3122
Hyperbola	23.206	31.4607	13.6849

Denoising using Discrete Fourier Cosine Transform (DFCT)

```
In[13]:= fourier = FourierDCTFilter[noisy, 0.27];
```

```
In[14]:= {SNR[im, fourier], PSNR[im, fourier], ImageDistance[im, fourier]}
```

```
Out[14]=  
{26.8835, 35.1382, 8.96248}
```