Rajshahi University of Engineering and Technology

Department of Computer Sceince and Engineering

Lab Report

Continuous Wavelet Transformation of a Signal/Image

Submitted By:
Riyad Morshed Shoeb
Roll: 1603013
Section: A

Submitted To:
Abu Sayeed
Assistant Professor

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```python
#!/usr/bin/env python
# coding: utf-8

# In[1]:


import numpy as np
import matplotlib.pyplot as plt
from scipy import signal


# In[2]:


t, dt   = np.linspace(0,1,200, retstep=True)
fs      = 1/dt
w       = 6


# In[18]:


input_signal    = np.cos(2*np.pi*(50+10*t)*t) + np.sin(40*np.pi*t)
freq            = np.linspace(1, fs/2, 100)
widths          = w*fs / (2*freq*np.pi)
cwt_morlet      = signal.cwt(input_signal, signal.morlet2, widths, w=w)
cwt_mexican_hat = signal.cwt(input_signal, signal.ricker, widths)


# In[19]:


plt.figure(figsize=(20,16), tight_layout=True)

plt.subplot(3,2,1)
plt.plot(input_signal)
plt.title('Input Signal')
plt.axis('off')

plt.subplot(3,2,3)
plt.plot(abs(signal.morlet2(M=100, s=4, w=2)))
plt.title('Morlet Wavelet')
plt.axis('off')

plt.subplot(3,2,4)
plt.plot(cwt_morlet)
plt.title('Coefficient plot generated using Morlet Wavelet')
plt.axis('off')

plt.subplot(3,2,5)
plt.plot(signal.ricker(points=100, a=4))
plt.title('Maxican Hat Wavelet')
plt.axis('off')

plt.subplot(3,2,6)
plt.plot(cwt_mexican_hat)
plt.title('Coefficient plot generated using Maxican Hat Wavelet')
plt.axis('off')
```
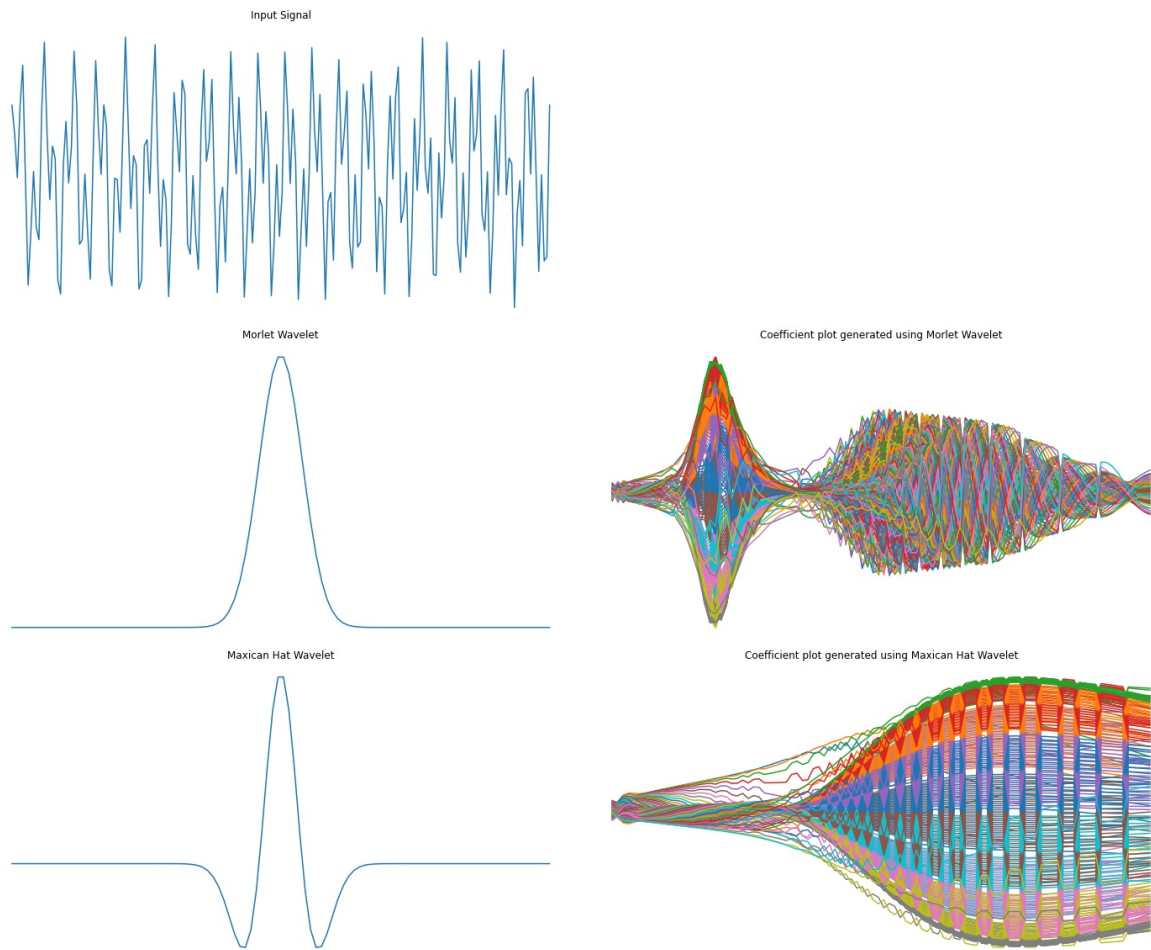
```
60 plt.savefig('plt.jpg')
```


Figure 1: Input Signal and Wavelet transformations using Morlet and Maxican Hat Wavelet

References

[1] *scipy.signal.morlet2 — SciPy v1.7.1 Manual*. URL: https://docs.scipy.org/doc/scipy/reference/generated/scipy.signal.morlet2.html (visited on 08/04/2021).

[2] *scipy.signal.ricker — SciPy v1.7.1 Manual*. URL: https://docs.scipy.org/doc/scipy/reference/generated/scipy.signal.ricker.html (visited on 08/04/2021).