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In [1]: import librosa
import librosa.display
import IPython.display as ipd
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In [2]: # load audio files
debussy_file = 'debussy.wav'
redhot_file = 'redhot.wav'
duke_file = 'duke.wav'
```

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In [3]: ipd.Audio(debussy_file)
```

Out[3]:

```
In [6]: ipd.Audio(redhot_file)
```

Out[6]:

```
In [7]: ipd.Audio(duke_file)
```

Out[7]:

```
In [8]: debussy, sr = librosa.load(debussy_file)
redhot, _ = librosa.load(redhot_file)
duke, _ = librosa.load(duke_file)
```

```
In [9]: debussy
Out[9]: array([-0.01742554, -0.03567505, -0.04995728, ..., 0.00912476,
0.00866699, 0.00964355], dtype=float32)
```

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In [11]: debussy.size
Out[11]: 661500
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In [15]: # duration of sample
sample_duration = 1/sr
print(sample_duration)
4.5351473922902495e-05
```

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In [18]: # duration of debussy file
duration = sample_duration * len(debussy)
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In [19]: print(duration)
30.0
```

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In [20]: import matplotlib.pyplot as plt
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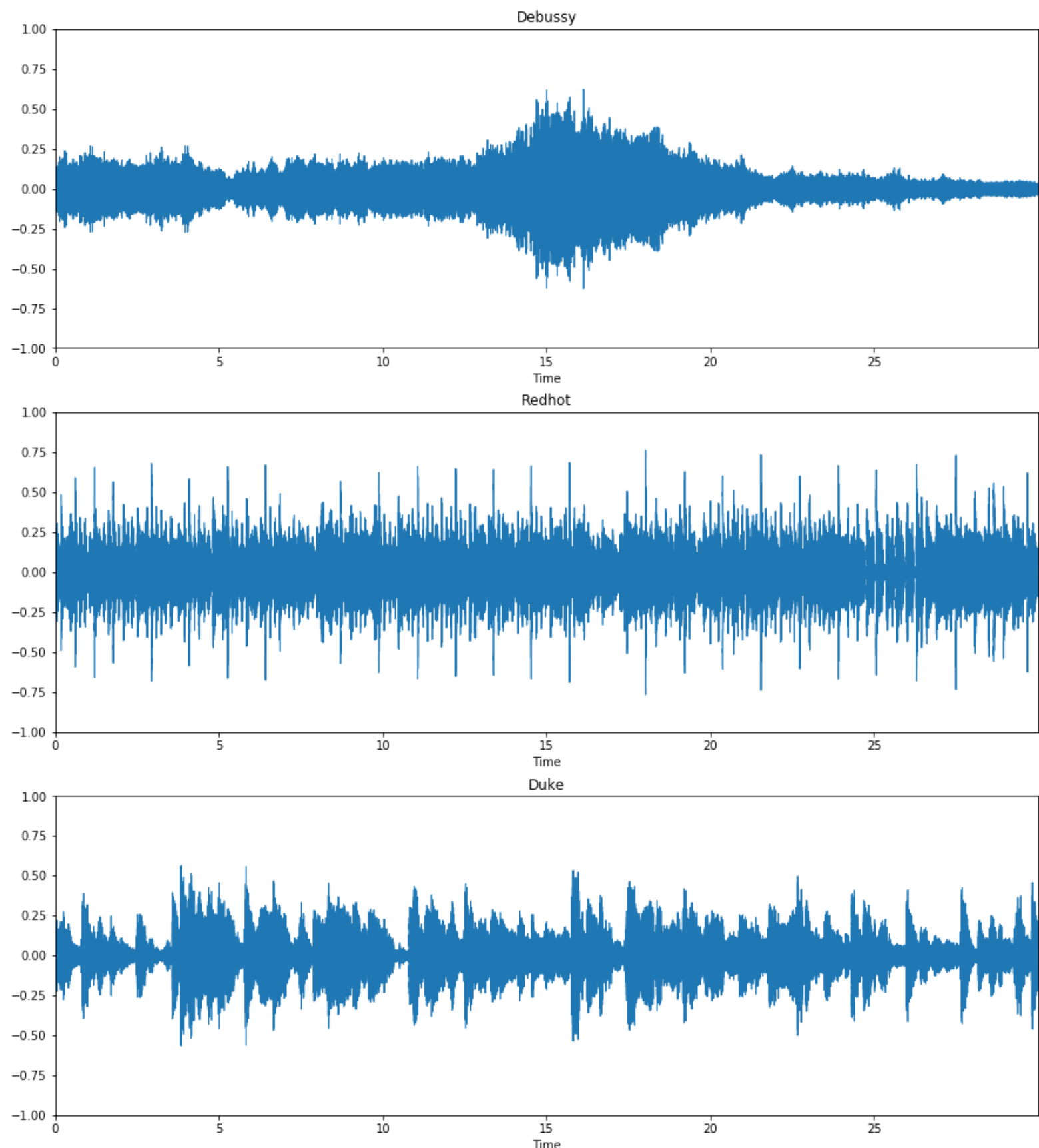
```
In [22]: # visualize the waveform
plt.figure(figsize=(15,17))

plt.subplot(3,1,1)
librosa.display.waveplot(debussy)
plt.title('Debussy')
plt.ylim((-1,1))

plt.subplot(3,1,2)
librosa.display.waveplot(redhot)
plt.title('Redhot')
plt.ylim((-1,1))

plt.subplot(3,1,3)
librosa.display.waveplot(duke)
plt.title('Duke')
plt.ylim((-1,1))

plt.show()
```



```
In [27]: import numpy as np
def amplitude_envelope(signal, frame_size,hop_length):

    amplitude_envelope= [0]

    for i in range(0,len(signal),hop_length):
        current_frame_amplitude = max(signal[i:i+frame_size])
        amplitude_envelope.append(current_frame_amplitude)

    return np.array(amplitude_envelope)
```

```
In [28]: FRAME_SIZE = 1024
hop_length = 512
ae_debussy = amplitude_envelope(debussy,FRAME_SIZE,hop_length)
len(ae_debussy)
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Out[28]: 1293
```

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In [29]: ae_debussy
Out[29]: array([0.         , 0.14065552, 0.14065552, ..., 0.03701782, 0.03701782,
0.02828979])
```

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In [30]: ae_redhot = amplitude_envelope (redhot,FRAME_SIZE,hop_length)
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In [31]: ae_duke = amplitude_envelope(duke,FRAME_SIZE,hop_length)
```

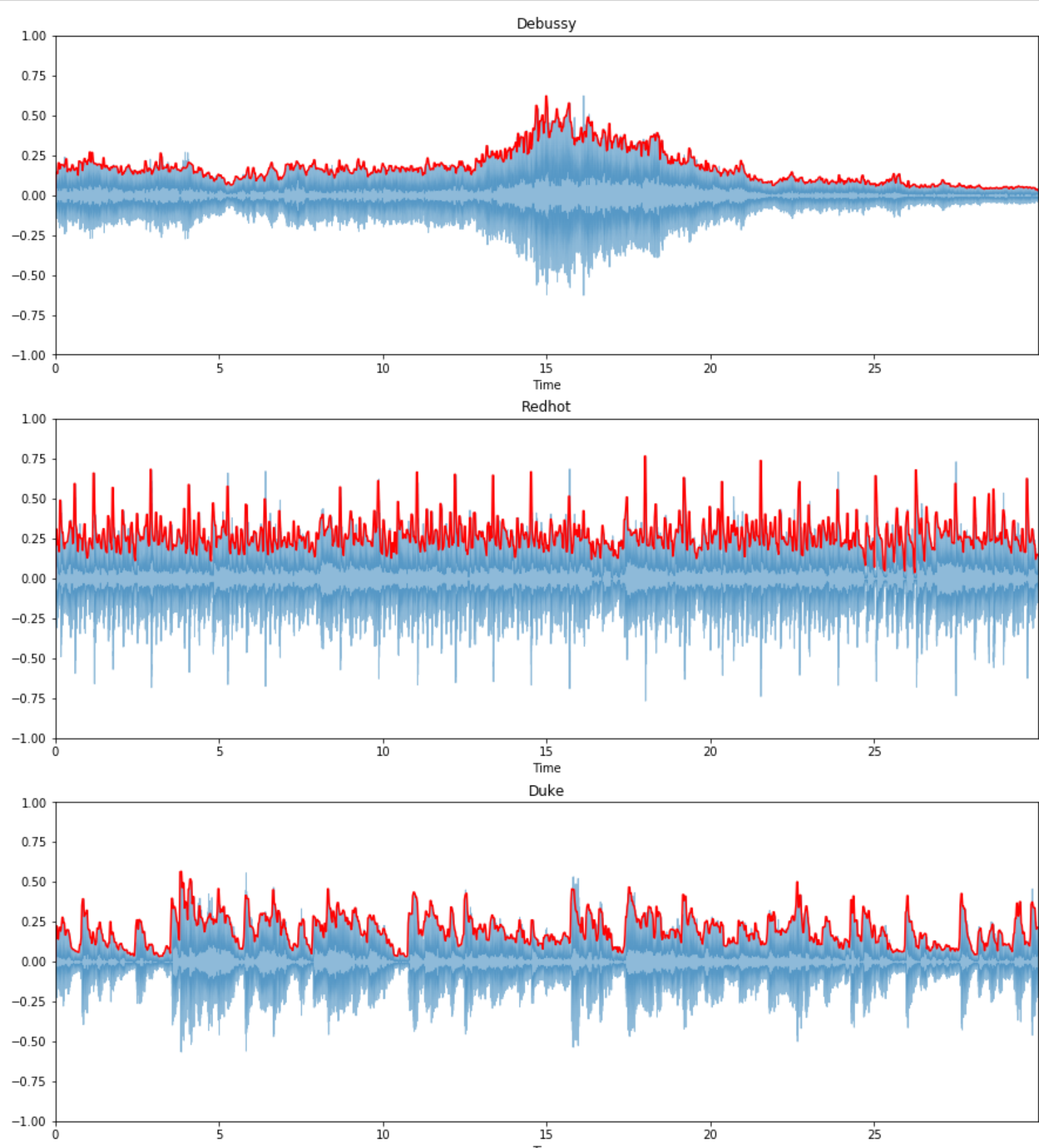
```
In [35]: # visualizing the ae plot
frames = range(0, ae_debussy.size)
t = librosa.frames_to_time(frames, hop_length=hop_length)
plt.figure(figsize=(15,17))

plt.subplot(3,1,1)
librosa.display.waveplot(debussy, alpha=0.5)
plt.plot(t,ae_debussy, color='r')
plt.title('Debussy')
plt.ylim((-1,1))

plt.subplot(3,1,2)
librosa.display.waveplot(redhot, alpha=0.5)
plt.plot(t,ae_redhot, color='r')
plt.title('Redhot')
plt.ylim((-1,1))

plt.subplot(3,1,3)
librosa.display.waveplot(duke, alpha=0.5)
plt.plot(t,ae_duke, color='r')
plt.title('Duke')
plt.ylim((-1,1))

plt.show()
```



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In [ ]:
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