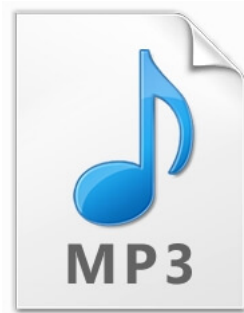


## Audio Formats

- mp3
- flac
- wav





## Audio Signal Parameters

- number of channels
- sample width (Bytes)
- framerate / sample rate (44100 KHz)
- number of frames
- value of frames

```
In [2]: 1 import wave
```

```
In [3]: 1 obj = wave.open('test.wav', 'rb')
```

```
In [4]: 1 obj
```

```
Out[4]: <wave.Wave_read at 0x7fb402147550>
```

```
In [6]: 1 obj.getnchannels()
```

```
Out[6]: 2
```

```
In [7]: 1 obj.getsampwidth()
```

```
Out[7]: 2
```

```
In [ ]: 1
```

```
In [8]: 1 obj.getframerate()
```

```
Out[8]: 44100
```

```
In [9]: 1 obj.getnframes()
```

```
Out[9]: 308700
```

```
In [27]: 1 new_obj.close()
```

```
In [29]: 1 new_obj2 = wave.open('new_audio2.wav', 'wb')
2 new_obj2.setframerate(32000)
3 new_obj2.setsampwidth(2)
4 new_obj2.setnchannels(2)
5 new_obj2.writeframes(frames)
6 new_obj2.close()
```

```
In [30]: 1 new_obj3 = wave.open('new_audio3.wav', 'wb')
2 new_obj3.setframerate(64000)
3 new_obj3.setsampwidth(2)
4 new_obj3.setnchannels(2)
5 new_obj3.writeframes(frames)
6 new_obj3.close()
```

```
In [31]: 1 new_obj4 = wave.open('new_audio4.wav', 'wb')
2 new_obj4.setframerate(44100)
3 new_obj4.setsampwidth(2)
4 new_obj4.setnchannels(1)
5 new_obj4.writeframes(frames)
6 new_obj4.close()
```

```
In [32]: 1 new_obj5 = wave.open('new_audio5.wav', 'wb')
2 new_obj5.setframerate(44100)
3 new_obj5.setsampwidth(1)
4 new_obj5.setnchannels(2)
5 new_obj5.writeframes(frames)
6 new_obj5.close()
```

```
In [42]: 1 import numpy as np
```

```
In [43]: 1 signal_array = np.frombuffer(frames, dtype=np.int16)
```

```
In [44]: 1 signal_array
```

```
Out[44]: array([  0,  0,  0, ..., 1421, 1475, 1457], dtype=int16)
```

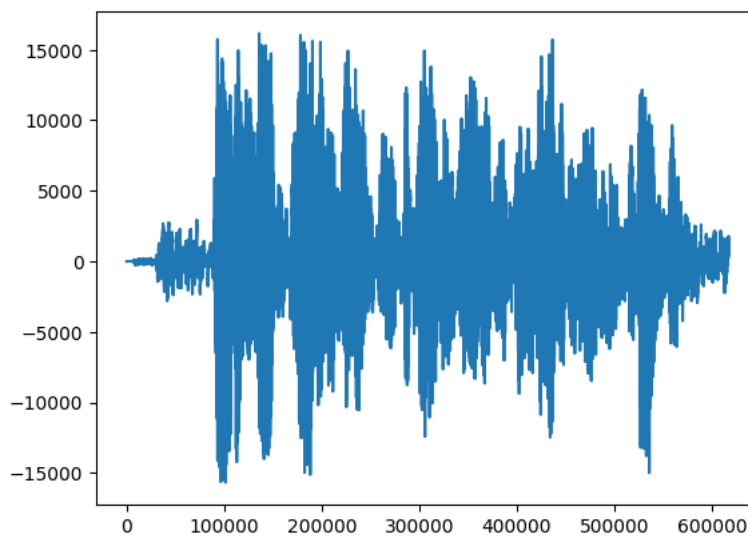
```
In [45]: 1 signal_array.shape
```

```
Out[45]: (617400,)
```

```
In [55]: 1 import matplotlib.pyplot as plt
2 %matplotlib inline
```

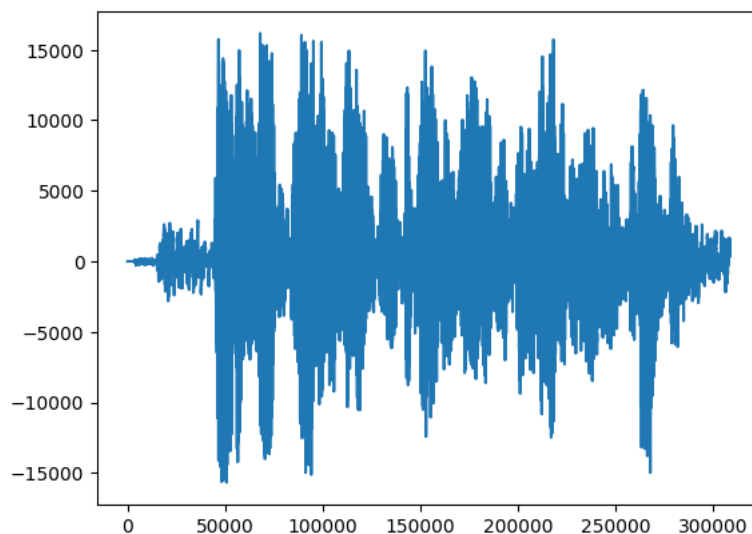
```
In [56]: 1 plt.plot(signal_array)
```

```
Out[56]: [<matplotlib.lines.Line2D at 0x7fb3eb502bf0>]
```



```
In [57]: 1 plt.plot(signal_array[:,2])
```

```
Out[57]: [<matplotlib.lines.Line2D at 0x7fb3eb3ab9d0>]
```

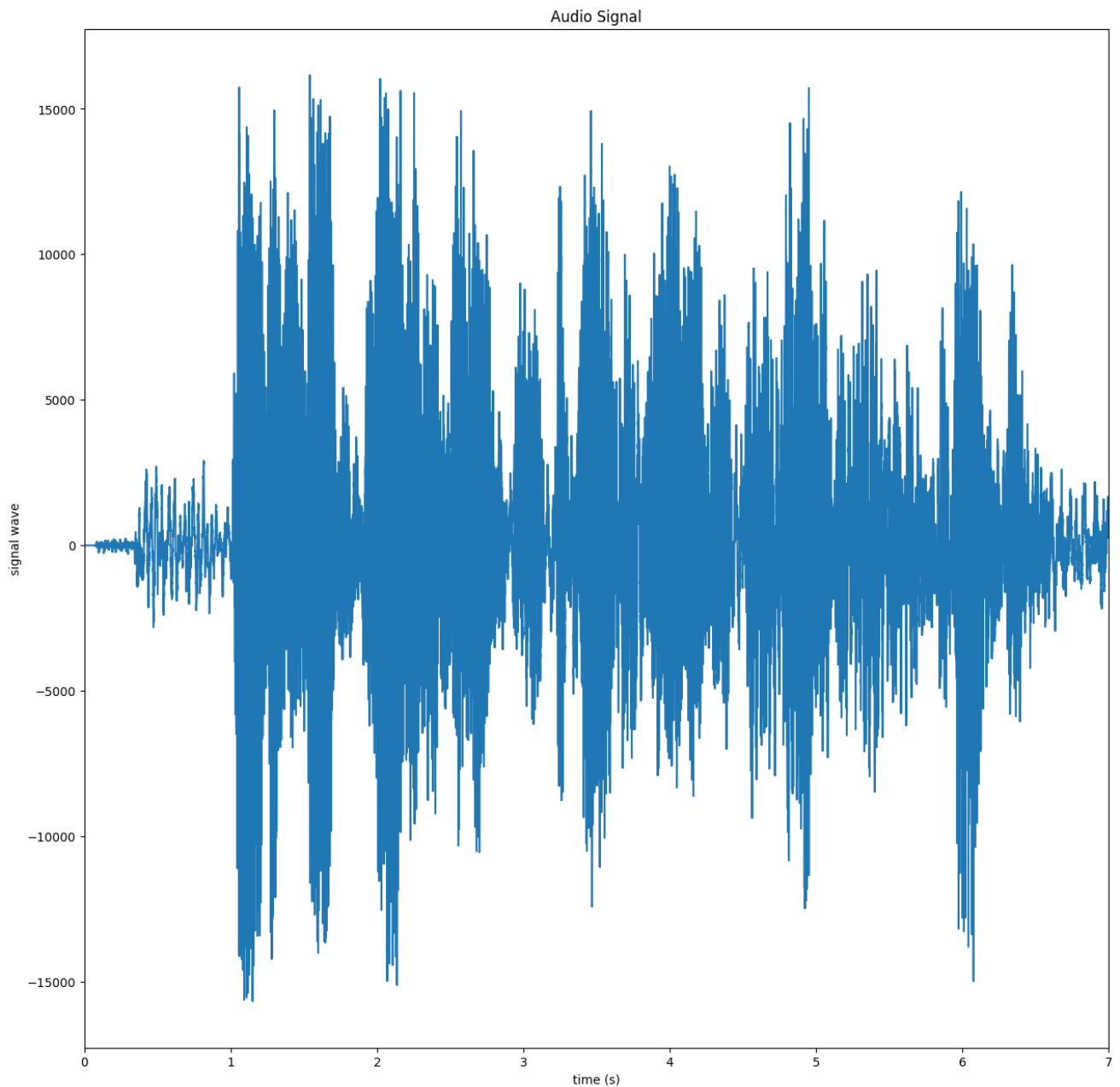


```
In [ ]: 1
```

```
In [58]: 1 new_obj6 = wave.open('new_audio6.wav', 'wb')
2 new_obj6.setframerate(44100)
3 new_obj6.setsampwidth(2)
4 new_obj6.setnchannels(1)
5 new_obj6.writeframes(signal_array[:,2].tobytes())
6 new_obj6.close()
```

```
In [59]: 1 new_obj7 = wave.open('new_audio7.wav', 'wb')
2 new_obj7.setframerate(22050)
3 new_obj7.setsampwidth(2)
4 new_obj7.setnchannels(1)
5 new_obj7.writeframes(signal_array[:,4].tobytes())
6 new_obj7.close()
```

```
In [60]: 1 data = signal_array[:,2]
2 times = np.linspace(0,time_audio,num=obj.getnframes())
3 plt.figure(figsize=(15,15))
4 plt.plot(times,data)
5 plt.title('Audio Signal')
6 plt.ylabel('signal wave')
7 plt.xlabel('time (s)')
8 plt.xlim(0,time_audio)
9 plt.show()
```



```
In [62]: 1 new_obj8 = wave.open('new_audio8.wav','wb')
2 new_obj8.setframerate(44100)
3 new_obj8.setsampwidth(2)
4 new_obj8.setnchannels(2)
5 new_obj8.writeframes((signal_array*2).tobytes())
6 new_obj8.close()
```

```
In [ ]: 1
```