LAB-7

MUKESH

BL.EN.U4AIE21050

In [1]:
```
import numpy as np
import librosa
from hmmlearn import hmm
```

In [2]:
```
def extract_features(file_path, n_mfcc=13, n_fft=2048, hop_length=512):
    # Load audio file
    y, sr = librosa.load(file_path)
    # Extract STFT features
    stft = np.abs(librosa.stft(y, n_fft=n_fft, hop_length=hop_length))
    mfccs = librosa.feature.mfcc(y=y, sr=sr, n_mfcc=n_mfcc)
    # Concatenate STFT and MFCC features
    features = np.concatenate([stft, mfccs], axis=0)
    return features.T
file_path = "MUKESH.ogg"
features = extract_features(file_path)
n_components = 3  # Number of states in HMM
covariance_type = "full"
model = hmm.GaussianHMM(n_components=n_components, covariance_type=covariance_type, n_
model.fit(features)
```

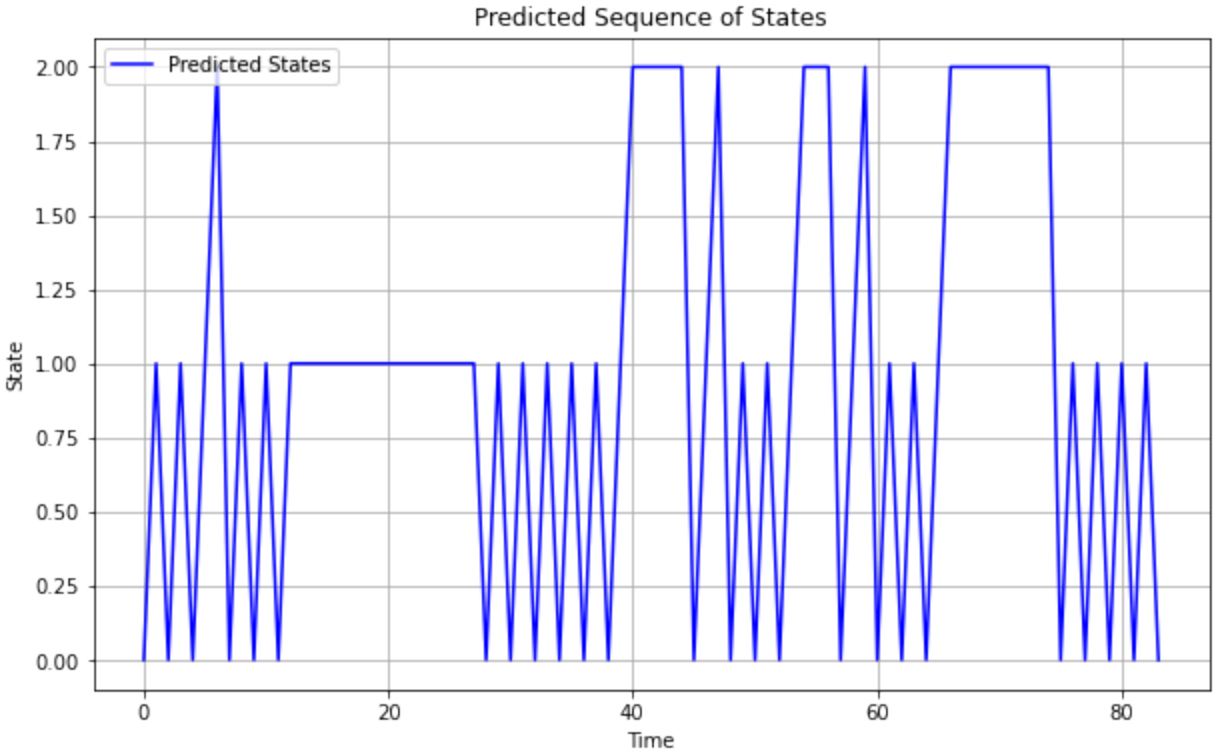
```
Fitting a model with 1620845 free scalar parameters with only 87192 data points will
result in a degenerate solution.
```

Out[2]:
```
GaussianHMM(covariance_type='full', n_components=3, n_iter=1000)
```

In [3]:
```
predicted_states = model.predict(features)
print("Predicted states sequence:", predicted_states)
```

```
Predicted states sequence: [0 1 0 1 0 1 2 0 1 0 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0
1 0 1 0 1 0 1 0
 1 0 1 2 2 2 2 2 0 1 2 0 1 0 1 0 1 2 2 2 0 1 2 0 1 0 1 0 1 2 2 2 2 2 2 2 2
 2 0 1 0 1 0 1 0 1 0]
```

In [4]:
```
import matplotlib.pyplot as plot
plot.figure(figsize=(10, 6))
plot.plot(predicted_states, label='Predicted States', color='blue')
plot.xlabel('Time')
plot.ylabel('State')
plot.title('Predicted Sequence of States')
plot.legend()
plot.grid(True)
plot.show()
```


Predicted Sequence of States
Predicted States
State
Time
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
0
20
40
60
80