```
# This Python 3 environment comes with many helpful analytics libraries installed
# It is defined by the kaggle/python Docker image: https://github.com/kaggle/docker-python
# For example, here's several helpful packages to load

import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)

# Input data files are available in the read-only "../input/" directory
# For example, running this (by clicking run or pressing Shift+Enter) will list all files under the input directory

import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        print(os.path.join(dirname, filename))

# You can write up to 20GB to the current directory (/kaggle/working/) that gets preserved as output when you create a version using "Sav
# You can also write temporary files to /kaggle/temp/, but they won't be saved outside of the current session
```

```
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_room_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_moon_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_name_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_wash_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_sour_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_goose_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_witch_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_chalk_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_hire_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_base_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_shout_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_seize_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_sell_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_third_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_voice_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_door_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_young_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_pole_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_bone_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_mess_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_soap_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_tool_fear.wav
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/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_dab_fear.wav
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/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_pass_fear.wav
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/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_chief_fear.wav
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/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_far_fear.wav
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/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_read_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_hash_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_met_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_calm_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_fail_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_gin_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_thumb_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_long_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_cab_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_ton_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_gas_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_lean_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_goal_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_bath_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_dip_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_tell_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_mob_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_which_fear.wav
/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_life_fear.wav
```

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import os
import seaborn as sns
import librosa
import librosa.display
from IPython.display import Audi
```

```
import warnings
```

```
paths = []
labels = []
import os
for dirname, _, filenames in os.walk('/kaggle/input'):
    for filename in filenames:
        paths.append(os.path.join(dirname, filename))
        label=filename.split('_')[-1]
        label=label.split('.')[0]
        labels.append(label.lower())
print("dataset is loaded")
```

```
dataset is loaded
```

```
paths[:5]
```

```
['/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_home_fear.wav',
 '/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_youth_fear.wav',
 '/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_near_fear.wav',
 '/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_search_fear.wav',
 '/kaggle/input/toronto-emotional-speech-set-tess/TESS Toronto emotional speech set data/YAF_fear/YAF_pick_fear.wav']
```

```
labels[:5]
```

```
['fear', 'fear', 'fear', 'fear', 'fear']
```

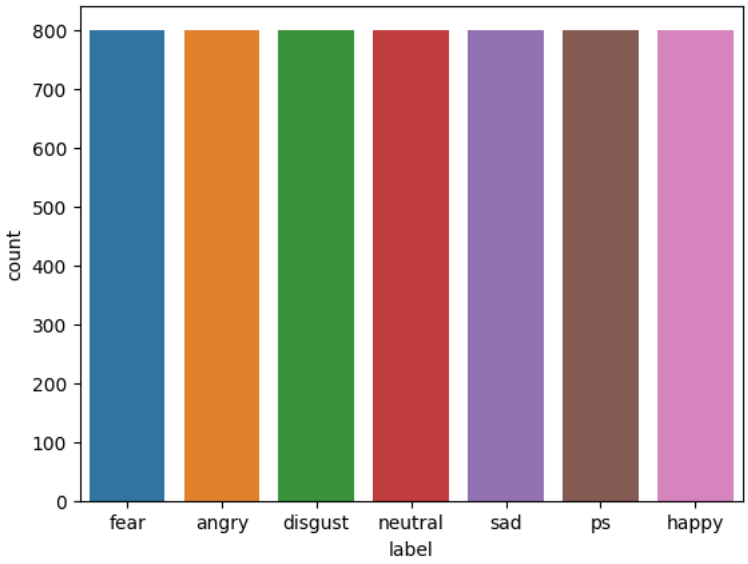
```
#create a dataframe
df = pd.DataFrame()
df['speech']=paths
df['label']=labels
df.head()
```

	speech	label
0	/kaggle/input/toronto-emotional-speech-set-tes...	fear
1	/kaggle/input/toronto-emotional-speech-set-tes...	fear
2	/kaggle/input/toronto-emotional-speech-set-tes...	fear
3	/kaggle/input/toronto-emotional-speech-set-tes...	fear
4	/kaggle/input/toronto-emotional-speech-set-tes...	fear

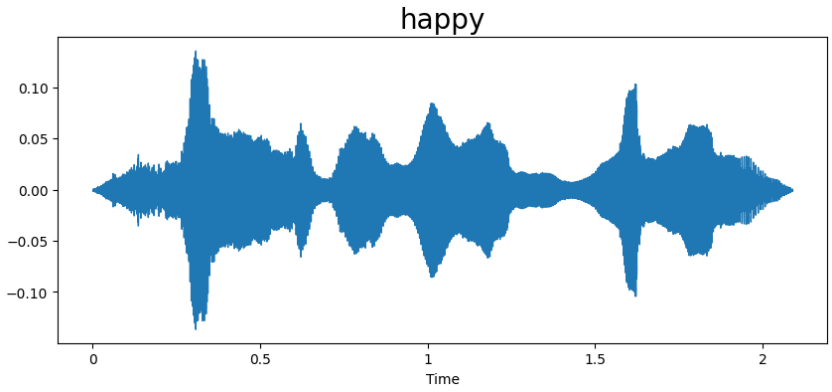
```
df["label"].value_counts()
```

```
label
fear       800
angry      800
disgust    800
neutral    800
sad        800
ps         800
happy      800
Name: count, dtype: int64
```

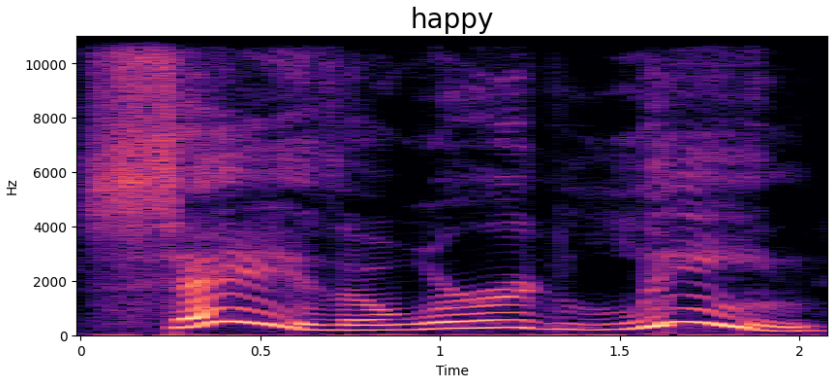
```
sns.countplot(data = df, x = "label")
plt.show()
```




```
def waveplot(data, sample_rate, emotion):
    plt.figure(figsize = (10, 4))
    plt.title(emotion, size = 20)

    librosa.display.waveshow(y = data, sr = sample_rate)
    plt.show()


def spectogram(data, sr, emotion):

    x = librosa.stft(data)
    xdb = librosa.amplitude_to_db(abs(x))

    plt.figure(figsize = (10, 4))
    plt.title(emotion, size = 20)

    librosa.display.specshow(data = xdb, sr = sr, x_axis = "time", y_axis = "hz")
    plt.show()


emotion = "happy"
path = df["speech"][df["label"] == emotion].reset_index()["speech"][259]
data, sample_rate = librosa.load(path)

waveplot(data, sample_rate, emotion)
```




```
spectogram(data, sample_rate, emotion)
```




```
Audio(path)
```

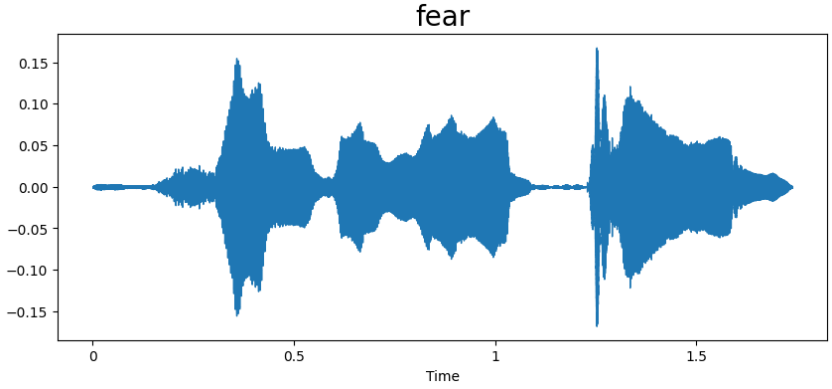
0:02 / 0:02

```
def extract_mfcc(filename):
    y, sr = librosa.load(filename, duration = 3, offset = 0.5)
    mfcc = np.mean(librosa.feature.mfcc(y = y, sr = sr, n_mfcc = 40).T, axis = 0)
    return mfcc
```

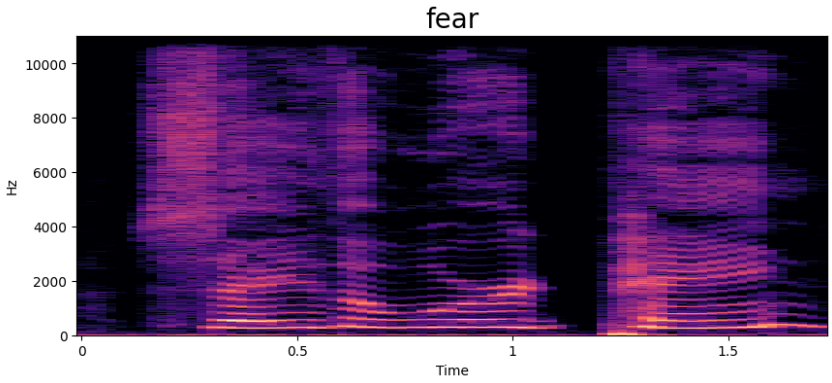
```
extract_mfcc(df["speech"][0])
```

```
     array([-285.73727   ,   85.78295   ,   -2.1689117 ,   22.125532  ,
            -14.757396  ,   11.051346  ,   12.41245   ,   -3.0002618 ,
              1.0844985 ,   11.078272  ,  -17.41966   ,   -8.093214  ,
              6.5879736 ,   -4.2209525 ,   -9.15508   ,    3.52148   ,
            -13.186381  ,   14.078851  ,   19.66973   ,   22.725618  ,
             32.57464   ,   16.325033  ,   -3.8427284 ,    0.89629704,
            -11.239264  ,    6.653461  ,   -2.5883696 ,   -7.7140164 ,
            -10.941657  ,   -2.4007552 ,   -5.2812867 ,    4.271157  ,
            -11.202218  ,   -9.024619  ,   -3.6669848 ,    4.8697433 ,
             -1.6027982 ,    2.5600514 ,   11.454374  ,   11.233449  ],
           dtype=float32)
```

```
emotion = "fear"
path = df["speech"][df["label"] == emotion].reset_index()["speech"][259]
data, sample_rate = librosa.load(path)

waveplot(data, sample_rate, emotion)
```




```
spectogram(data, sample_rate, emotion)
```


fear
10000
8000
6000
4000
2000
0
Hz
0
0.5
1
1.5
Time