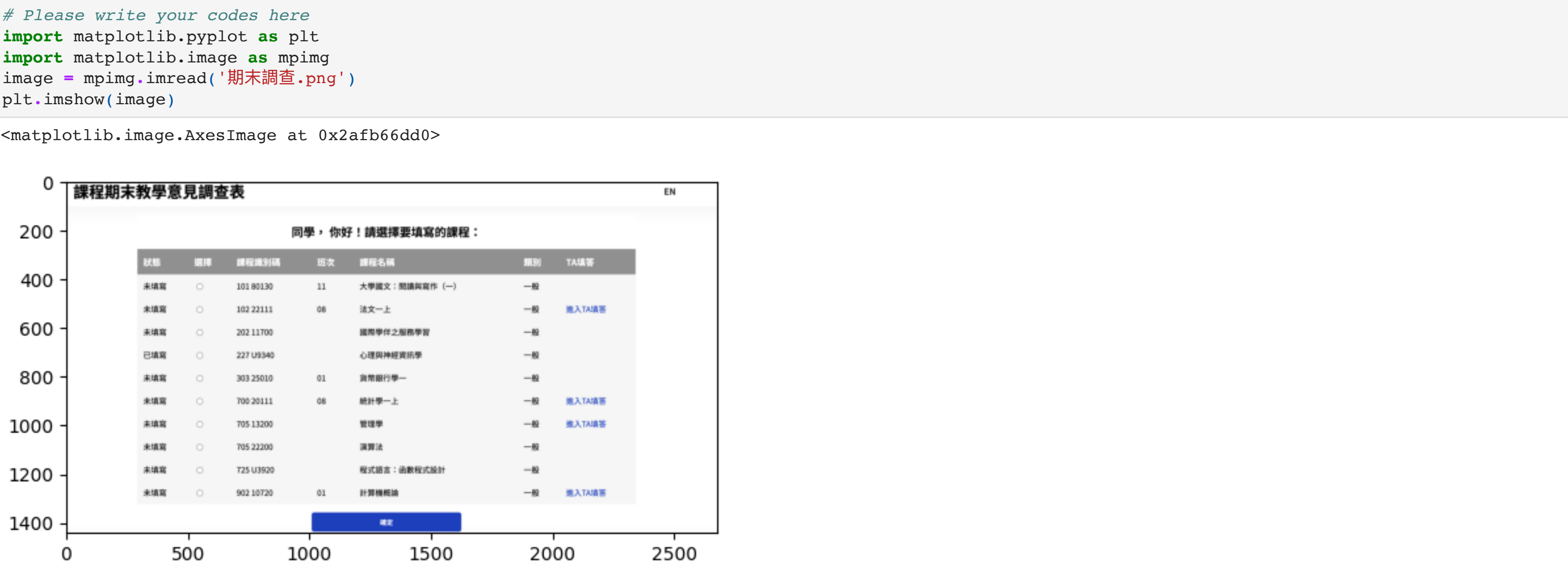


Psychoinformatics - Week 14 (Exercises)

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1 教學意見調查 (4 points)

Please provide a screenshot showing that you've completed the evaluation of this course, and thanks for your feedback!



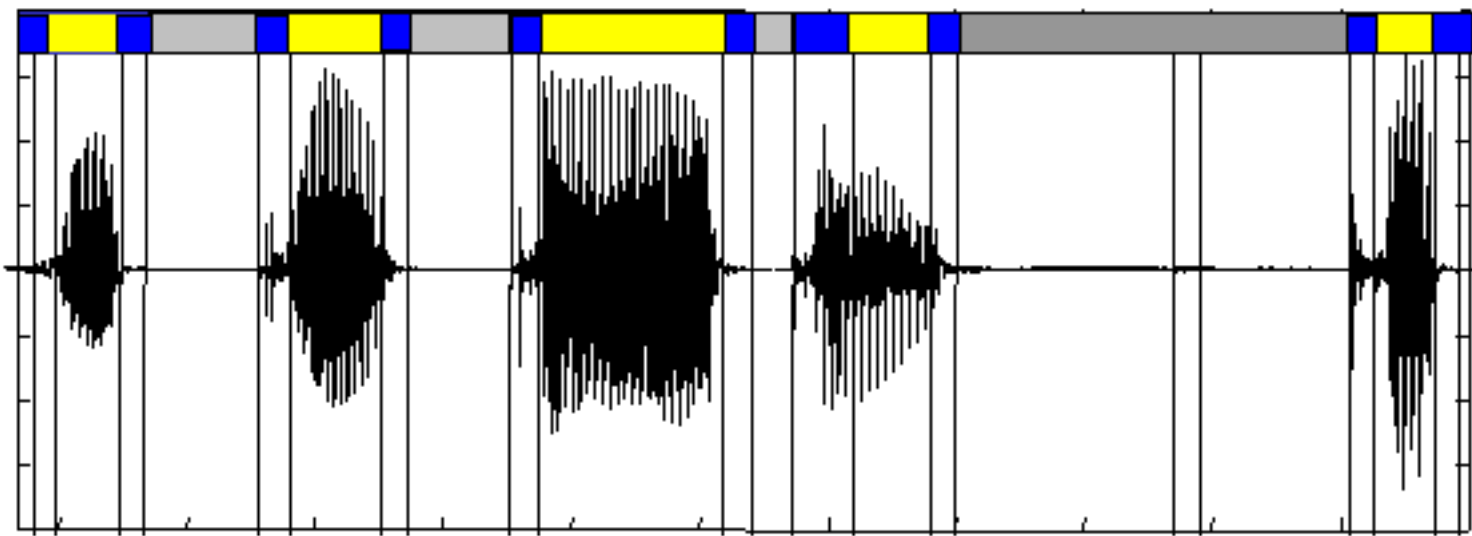
2 Audio Segementation (4 points)

Please use one audio/speech segementation method of your choice (including your own codes) to calculate:

- [1] the number of segments, and
- [2] the total speech duration of all the segments (seconds)

of each .wav file in <https://ceiba.ntu.edu.tw/course/4671ea/content/speech.zip> .

In the following example, there are 5 segements and the total speech duration is the sum of yellow(+blue) periods.



In [ ]:

```
import librosa
import numpy as np

def energy_based_segmentation(audio_file,):
    y, sr = librosa.load(audio_file, sr=None)

    # Calculate energy of the audio signal
    energy = np.sum(np.square(y))

    # Set a threshold for energy to determine segments
    threshold = 0.1 * energy

    # Find segments based on energy
    segments = librosa.effects.split(y, top_db=threshold)

    # Calculate the number of segments
    num_segments = len(segments)

    # Calculate the total speech duration
    total_duration = sum([librosa.get_duration(y=y[start:end], sr=sr) for start, end in segments])

    return num_segments, total_duration
```

In [ ]:

```
import os

directory_path1 = "speech/happy"

# Iterate through all files in the directory
for filename in os.listdir(directory_path1):
    if filename.endswith(".wav"):
        # Create the full path to the .wav file
        audio_file_path = os.path.join(directory_path1, filename)

        # Perform audio segmentation for each file
        num_segments, total_duration = energy_based_segmentation(audio_file_path)

        # Print the results for each file
        print(f"File: {filename}")
        print("Number of Segments:", num_segments)
        print("Total Duration of Segments (seconds):", total_duration)
        print("-----")
```

File: 51\_F\_H\_6.wav  
Number of Segments: 9  
Total Duration of Segments (seconds): 0.41795918367346946  
-----  
File: 68\_M\_H\_6.wav  
Number of Segments: 7  
Total Duration of Segments (seconds): 1.5209070294784581  
-----  
File: 62\_F\_H\_6.wav  
Number of Segments: 8  
Total Duration of Segments (seconds): 0.9636281179138323  
-----  
File: 56\_F\_H\_7.wav  
Number of Segments: 2  
Total Duration of Segments (seconds): 0.19736961451247165  
-----  
File: 69\_M\_H\_7.wav  
Number of Segments: 7  
Total Duration of Segments (seconds): 0.7894784580498866  
-----  
File: 53\_F\_H\_6.wav  
Number of Segments: 8  
Total Duration of Segments (seconds): 0.557278911564626  
-----  
File: 66\_F\_H\_6.wav  
Number of Segments: 1  
Total Duration of Segments (seconds): 0.034829931972789115  
-----  
File: 74\_F\_H\_6.wav  
Number of Segments: 3  
Total Duration of Segments (seconds): 0.13931972789115646  
-----  
File: 75\_F\_H\_7.wav  
Number of Segments: 13  
Total Duration of Segments (seconds): 0.882358276643991  
-----  
File: 59\_F\_H\_7.wav  
Number of Segments: 2  
Total Duration of Segments (seconds): 0.046439909297052155  
-----

In [ ]:

```
directory_path2 = "speech/anger"

# Iterate through all files in the directory
for filename in os.listdir(directory_path2):
    if filename.endswith(".wav"):
        # Create the full path to the .wav file
        audio_file_path = os.path.join(directory_path2, filename)

        # Perform audio segmentation for each file
        num_segments, total_duration = energy_based_segmentation(audio_file_path)

        # Print the results for each file
        print(f"File: {filename}")
        print("Number of Segments:", num_segments)
        print("Total Duration of Segments (seconds):", total_duration)
        print("-----")
```

File: 55\_F\_A\_3.wav  
Number of Segments: 5  
Total Duration of Segments (seconds): 0.2902494331065759  
-----  
File: 56\_F\_A\_9.wav  
Number of Segments: 4  
Total Duration of Segments (seconds): 1.4048072562358276  
-----  
File: 65\_M\_A\_8.wav  
Number of Segments: 4  
Total Duration of Segments (seconds): 0.9752380952380952  
-----  
File: 60\_M\_A\_7.wav  
Number of Segments: 2  
Total Duration of Segments (seconds): 2.3219954648526073  
-----  
File: 54\_F\_A\_1.wav  
Number of Segments: 3  
Total Duration of Segments (seconds): 1.4164172335600906  
-----  
File: 62\_F\_A\_9.wav  
Number of Segments: 3  
Total Duration of Segments (seconds): 1.7182766439909298  
-----  
File: 52\_M\_A\_8.wav  
Number of Segments: 8  
Total Duration of Segments (seconds): 1.2654875283446712  
-----  
File: 60\_F\_A\_8\_2.wav  
Number of Segments: 2  
Total Duration of Segments (seconds): 0.2089795918367347  
-----  
File: 60\_F\_A\_8.wav  
Number of Segments: 5  
Total Duration of Segments (seconds): 0.4411791383219955  
-----  
File: 54\_M\_A\_9.wav  
Number of Segments: 5  
Total Duration of Segments (seconds): 1.6950566893424035  
-----