搖滾一條龍

DRAGON ROCK

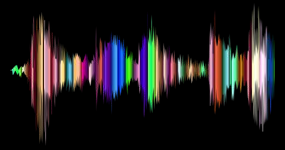
許益誠 JT081003

傅傳岩 JT081001

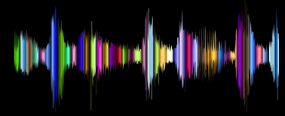
吳冠承 JT081027

李安說過:每個人心中都有...

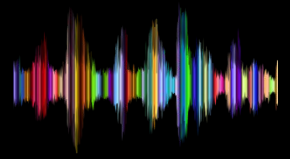
CAN AI DISTINGUISH MUSIC GENRES?



Classical



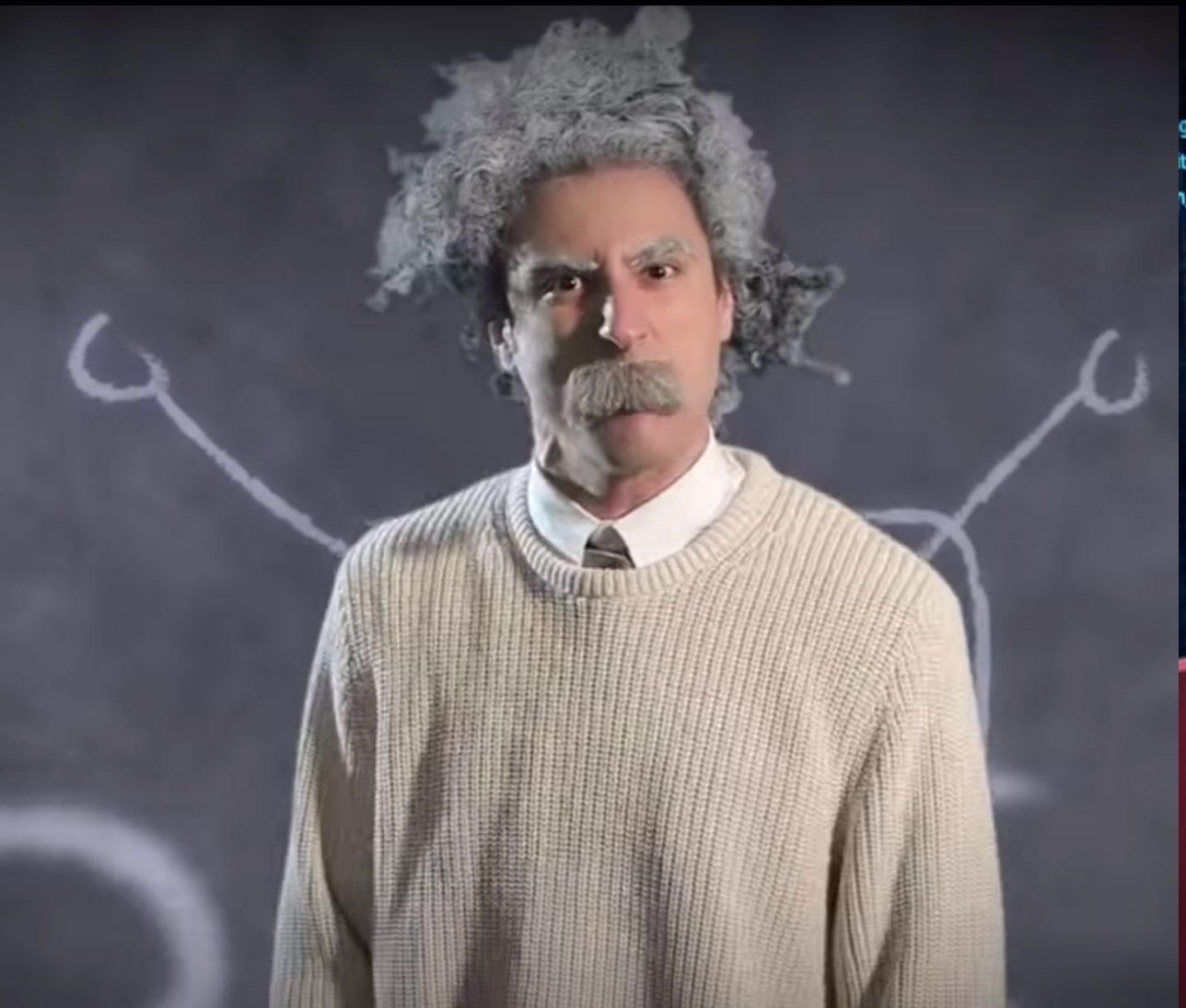
Jazz



Hip
Hop

Rock

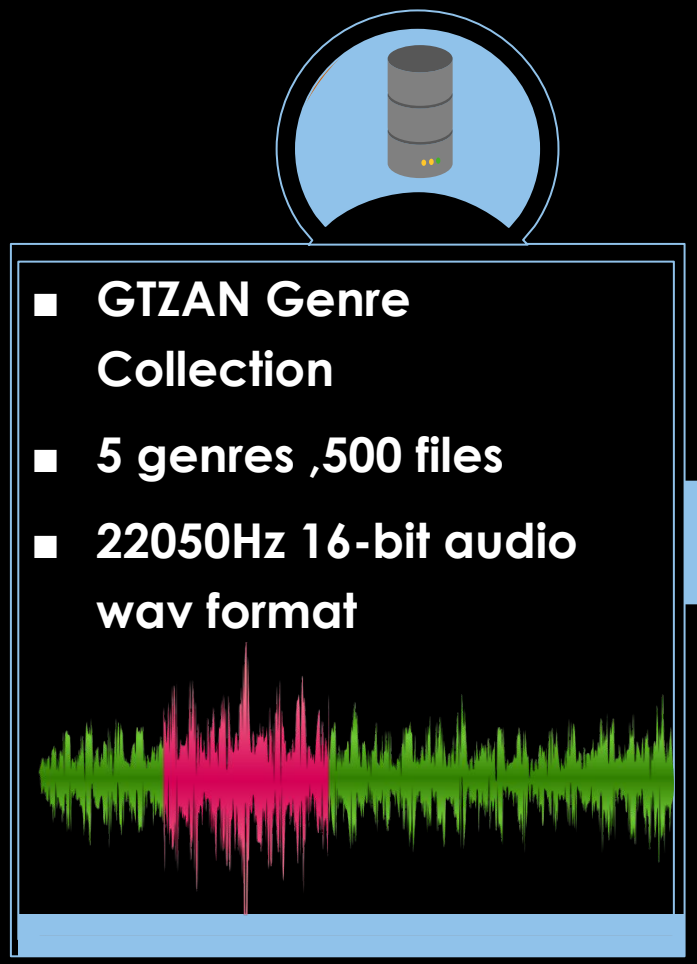
愛因岩坦。傑克森(傅傳岩)



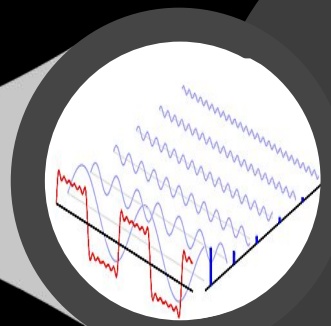
比爾。冠承(吳冠承)

EXPERIMENTAL DESIGN

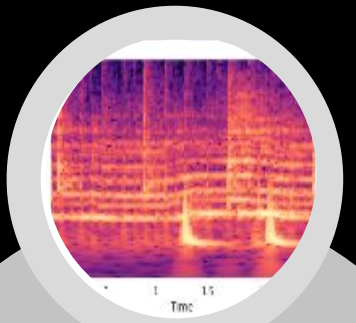
- GTZAN Genre Collection
- 5 genres ,500 files
- 22050Hz 16-bit audio wav format



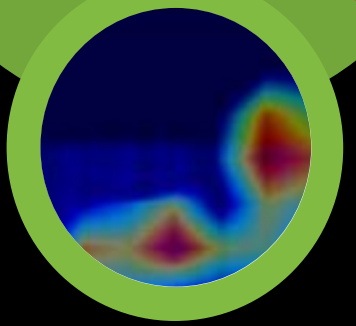
STEP1 |
特徵萃取



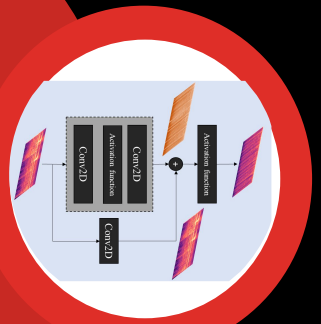
STEP2 |
音訊前處理



STEP3 |
模型訓練

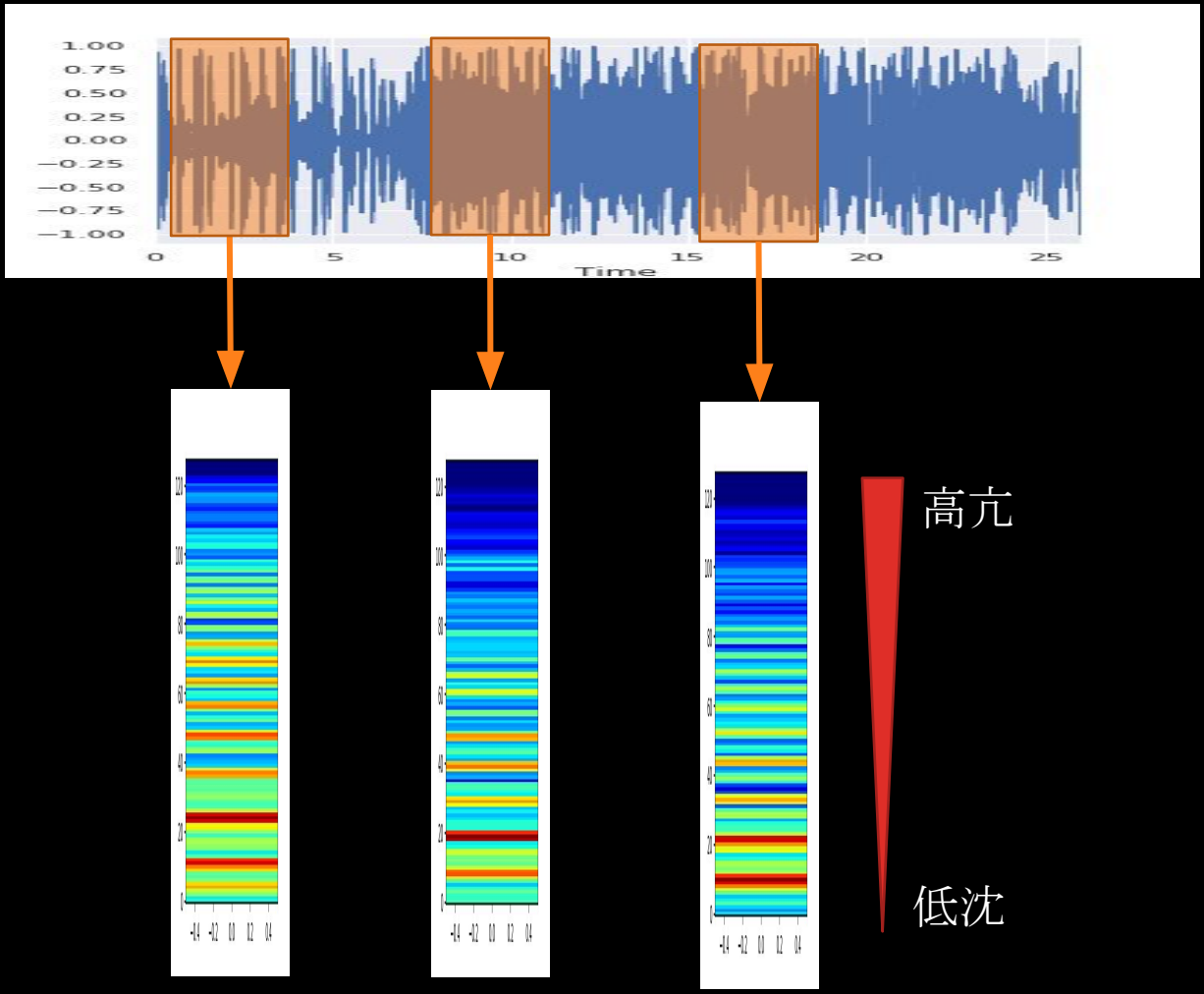


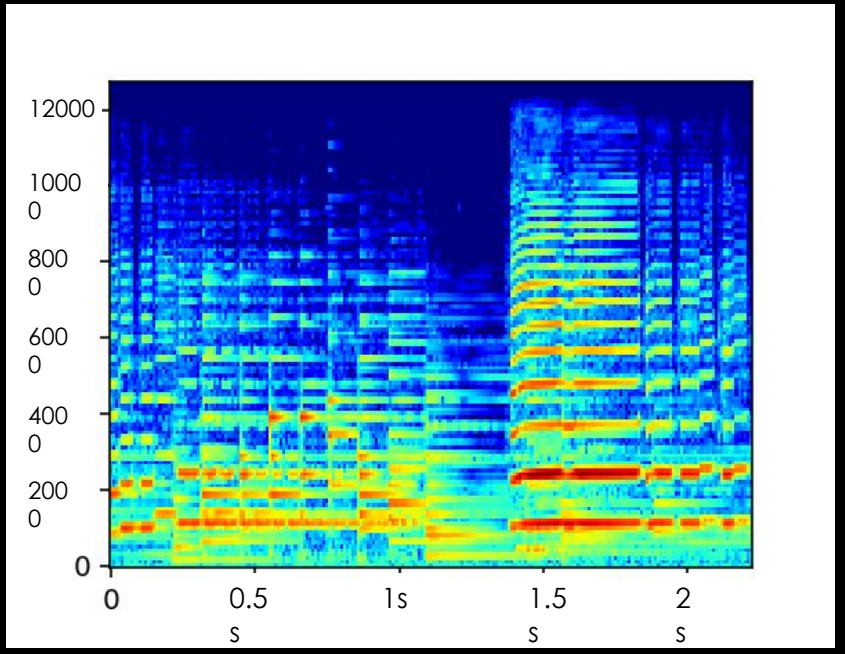
STEP4 |
模型解釋



STEP1 |
特徵萃取(Feature Extraction)

SPECTRUM





STEP1 | 特徵萃取(Feature Extraction)

SPECTRUM PATTERNS

Saxophone

Drum

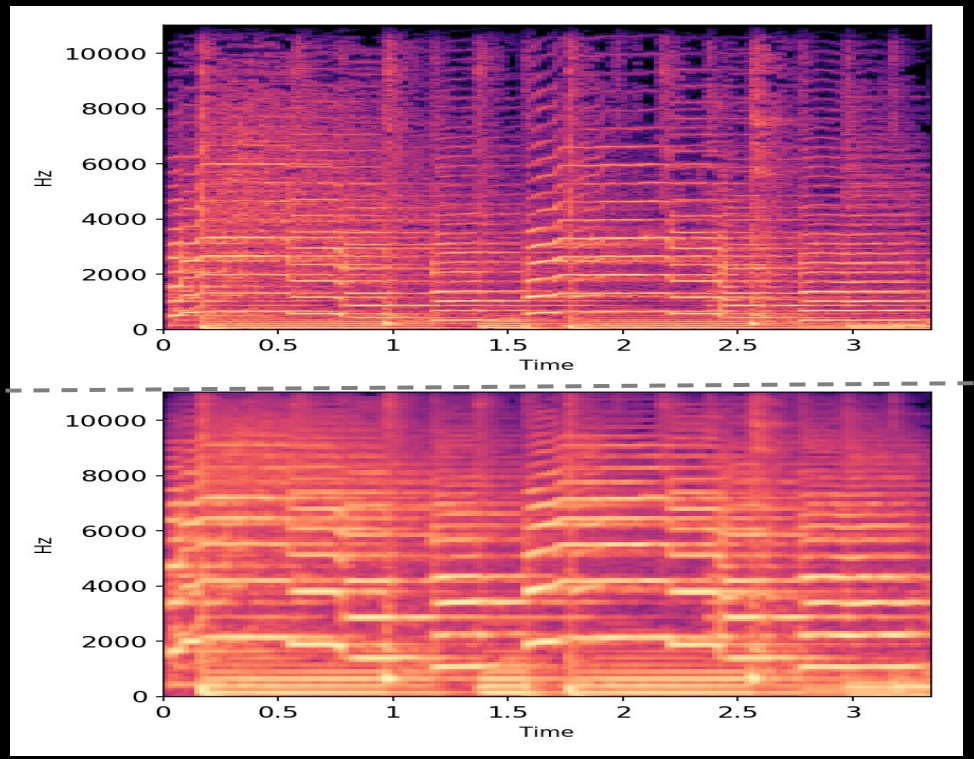
STFT

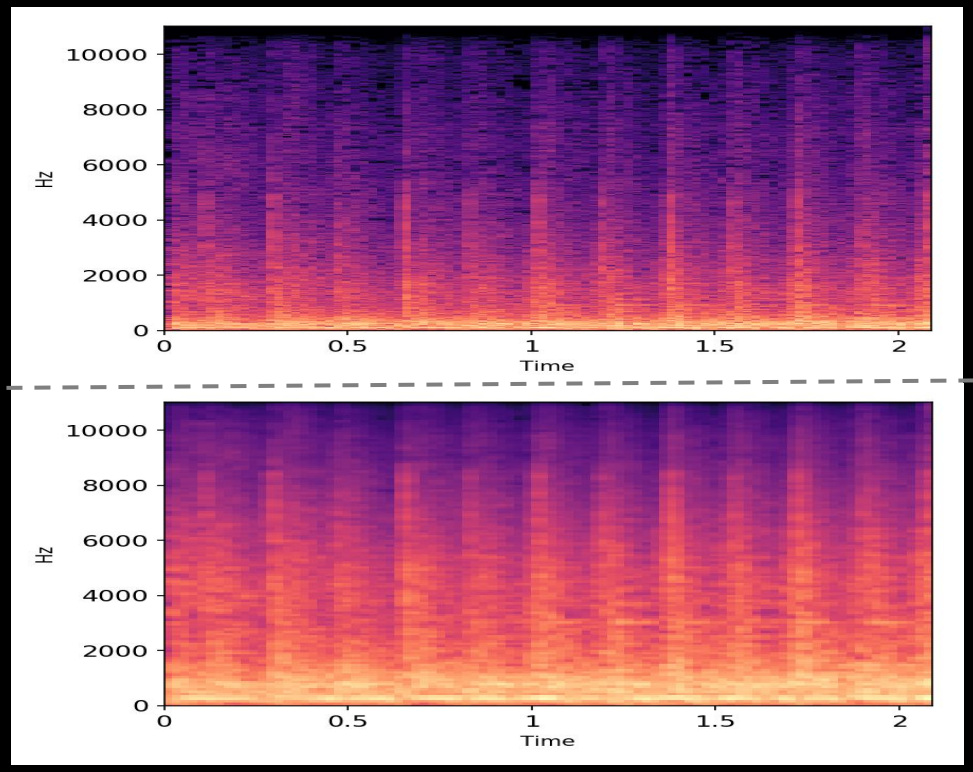
672X224

減少特徵

Mel

128X224

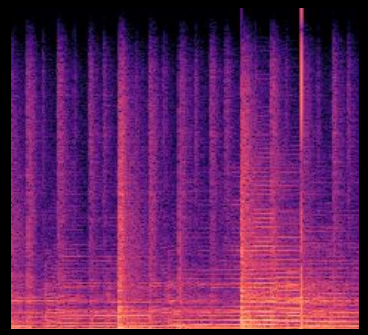


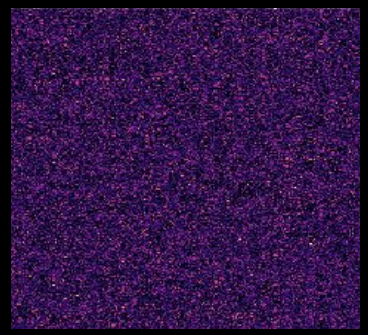


STEP2 |
資料前處理(Pre-processing Input)

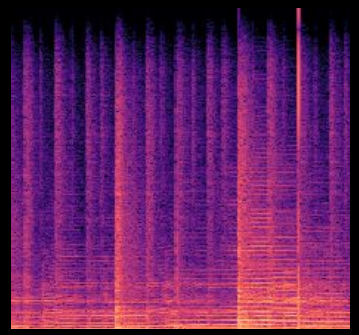
NOISES & MISSING DATA FILLING

時頻譜圖(原始)



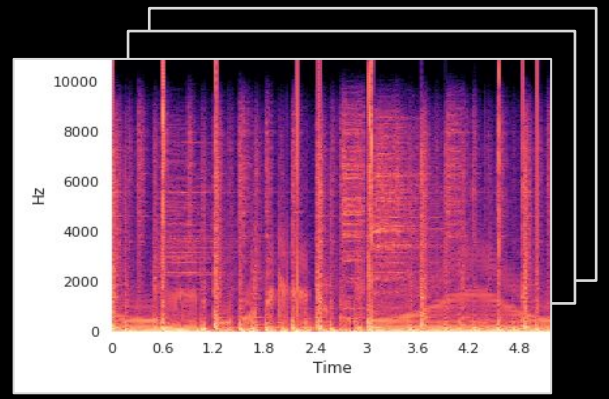


Noise

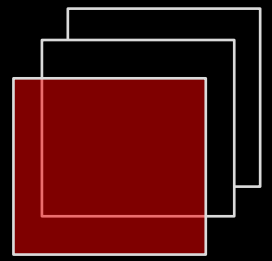


Noise Level:1e-05

STFT feature

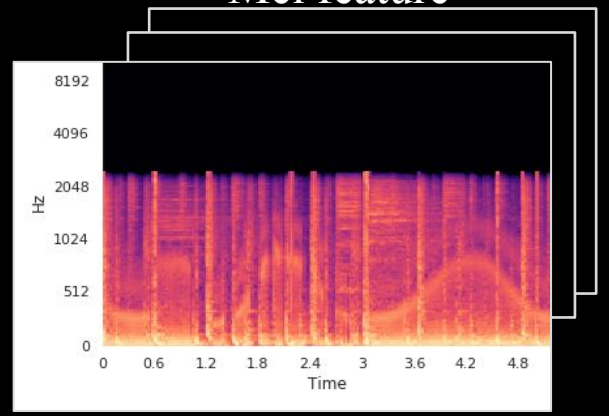


672X224X1

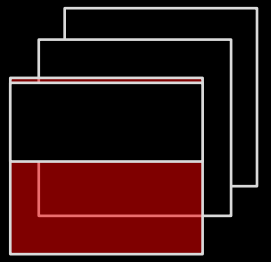


672x224x3

Mel feature



128X224X1



224x224x3

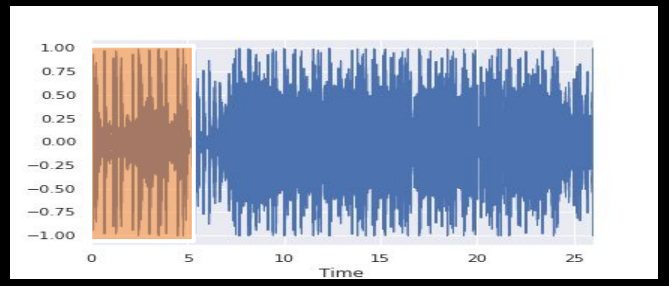
STEP3 |
模型訓練

MODEL TRAINING WITH DIFFERENT TIME WINDOW

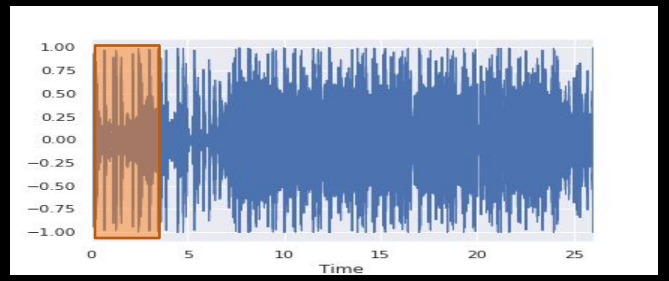
Time window

進行隨機取樣訓練

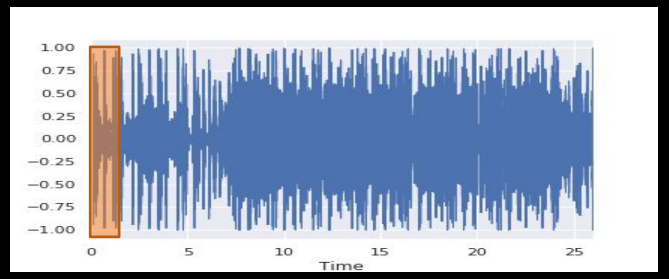
5s



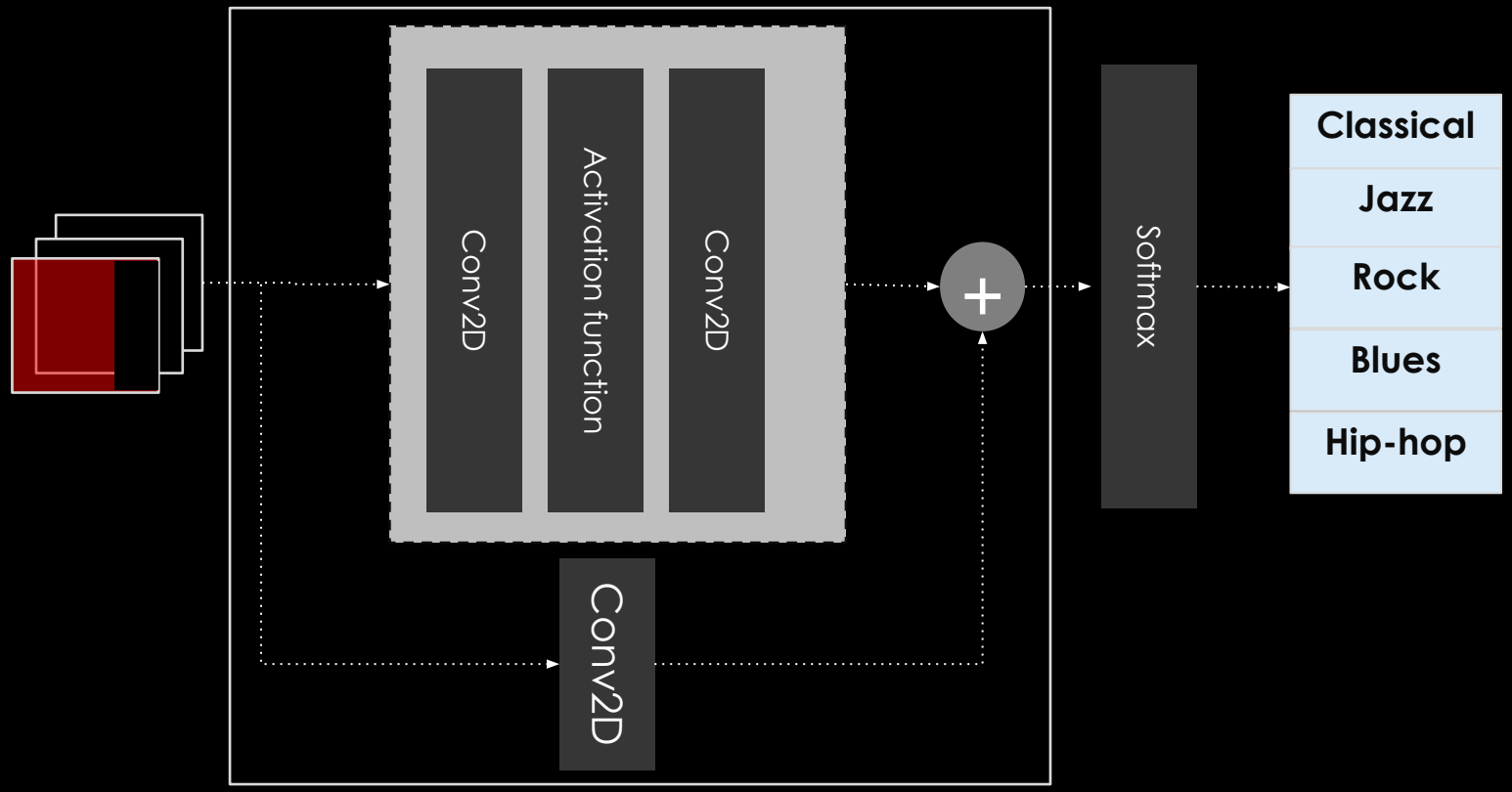
3s



1.3s



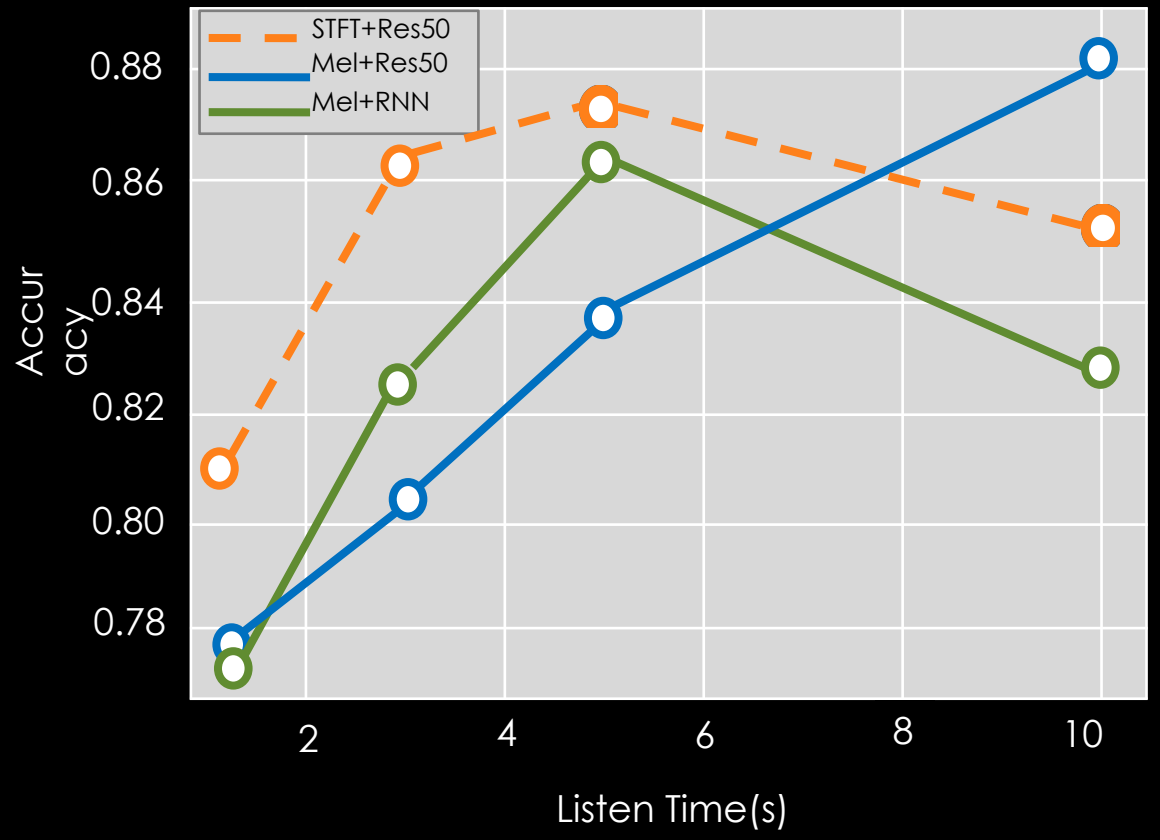
ResNet50 Transfer



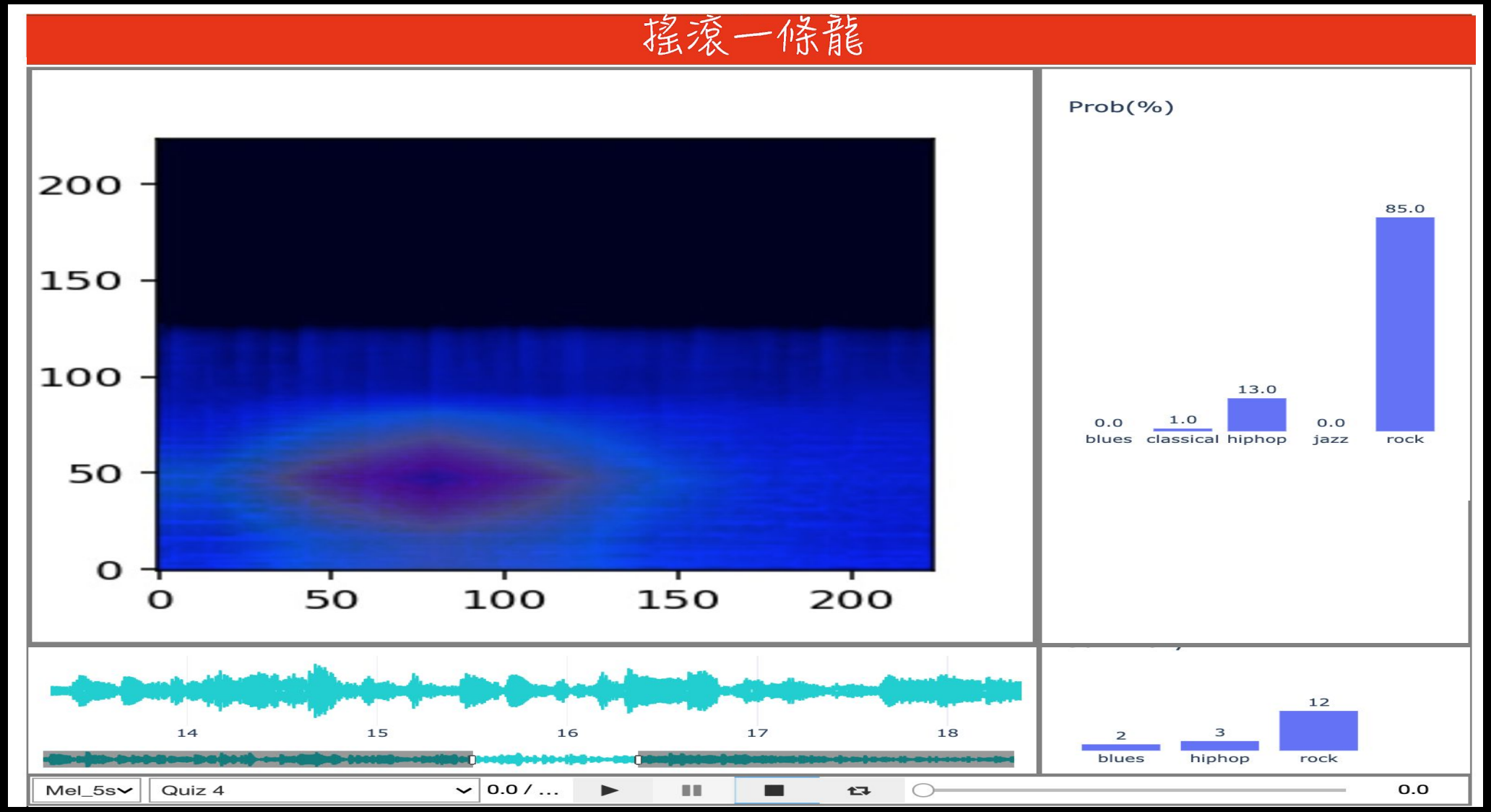
STEP3 |
模型訓練

MODEL PERFORMANCE

	ResNet50 (STFT,time:5s)	ResNet 50 (Mel,time:5s)	LSTM RNN (Mel,time:5s)
Accuracy	87.2%	83.4%	86.8%
Input IMG Size	672x224x1	224x224x1	128x223x1
Single IMG Predict Time (s)	0.0166	0.0131	0.00066

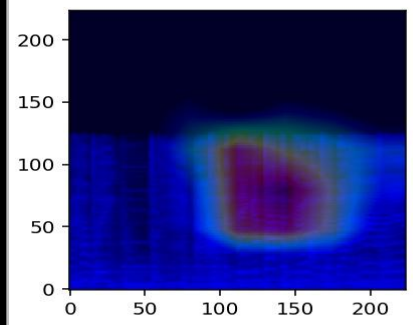
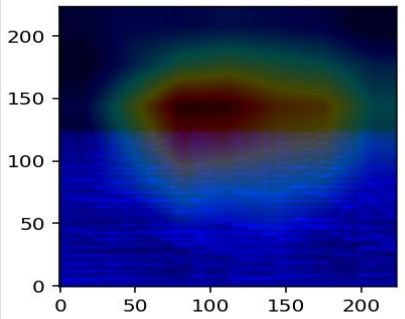
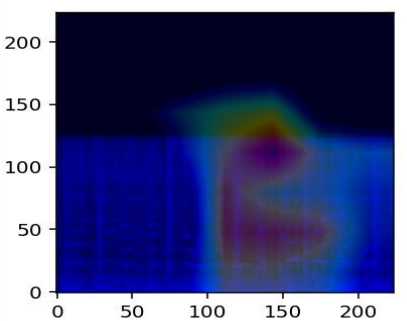
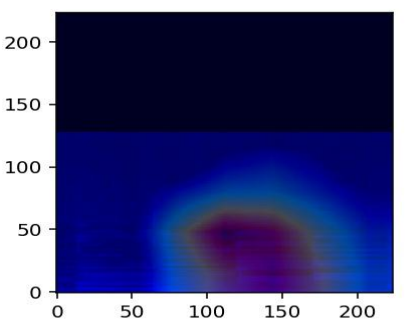
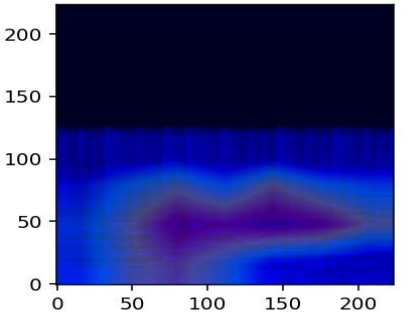
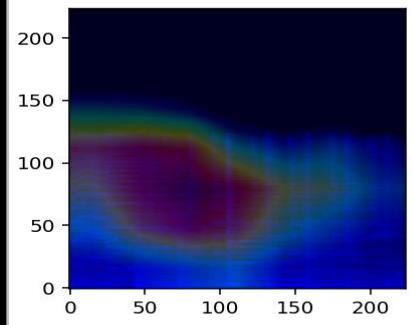
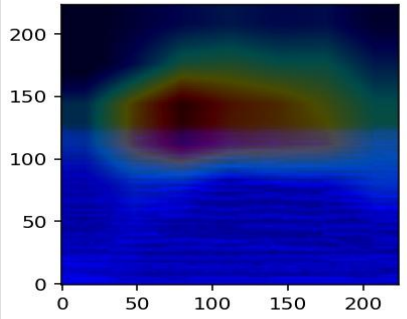
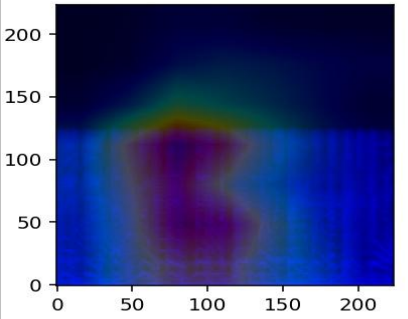
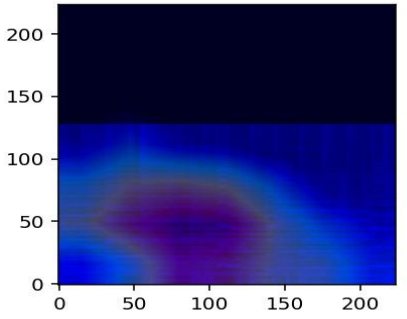
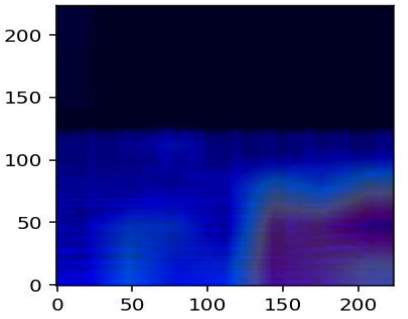


模型解釋 - CAM PLAYER



STEP4 |
模型解釋 / GRAD-CAM

VISUALIZATION & EXPLANATION

Blues	Classical	Hiphop	Jazz	Rock
				
				

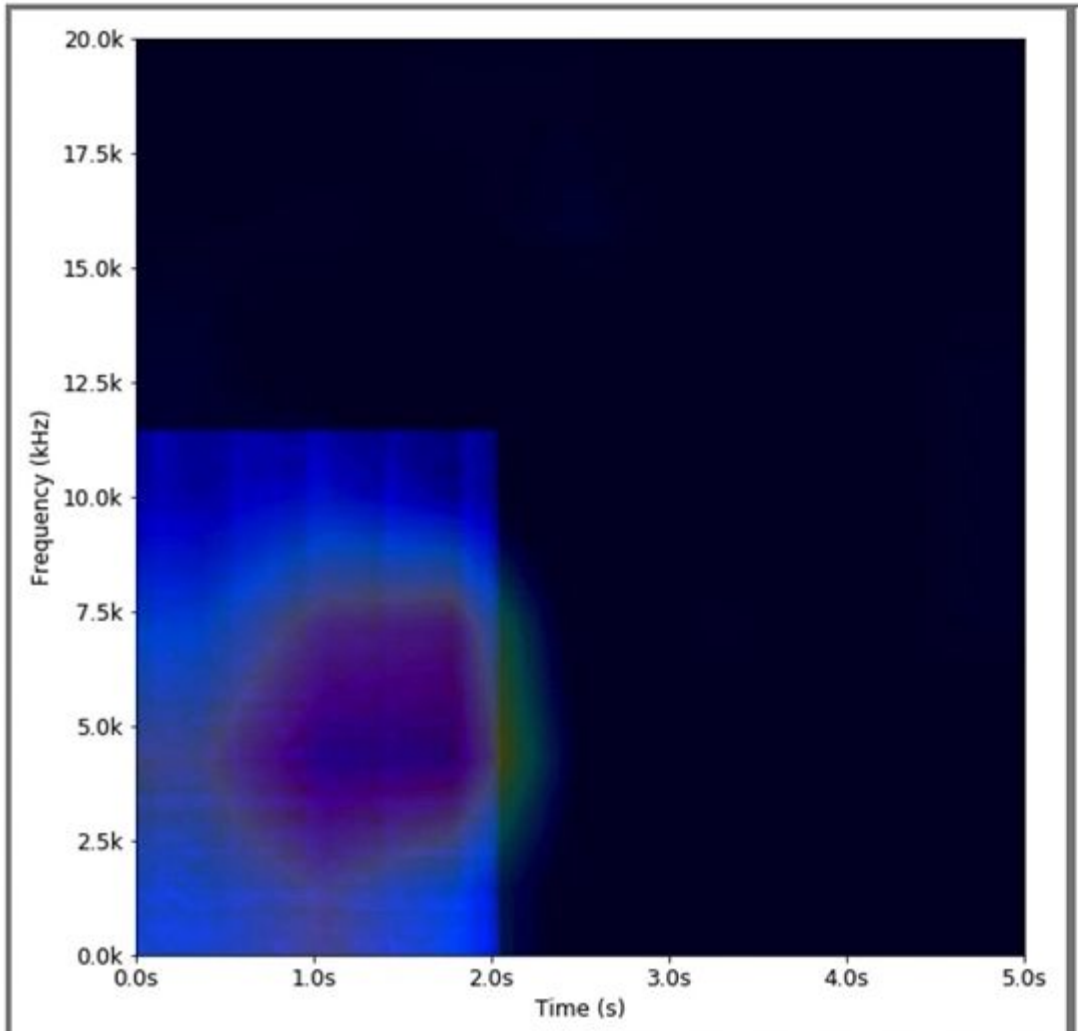
LETS PK

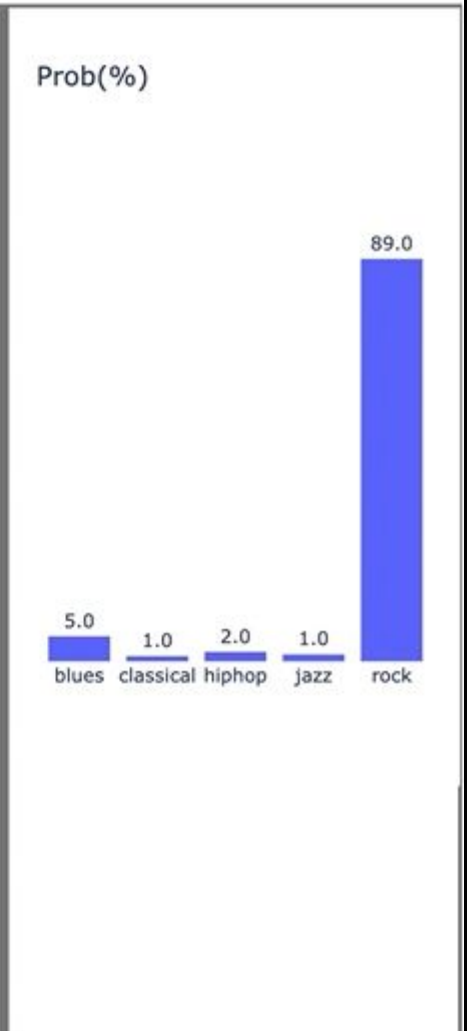
https://forms.gle/o5U1xwzXYCfDLdS87

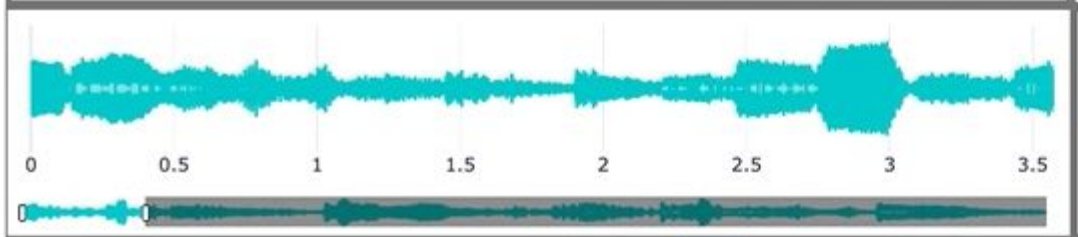
Quiz 1

Quiz 2

搖滾一條龍！





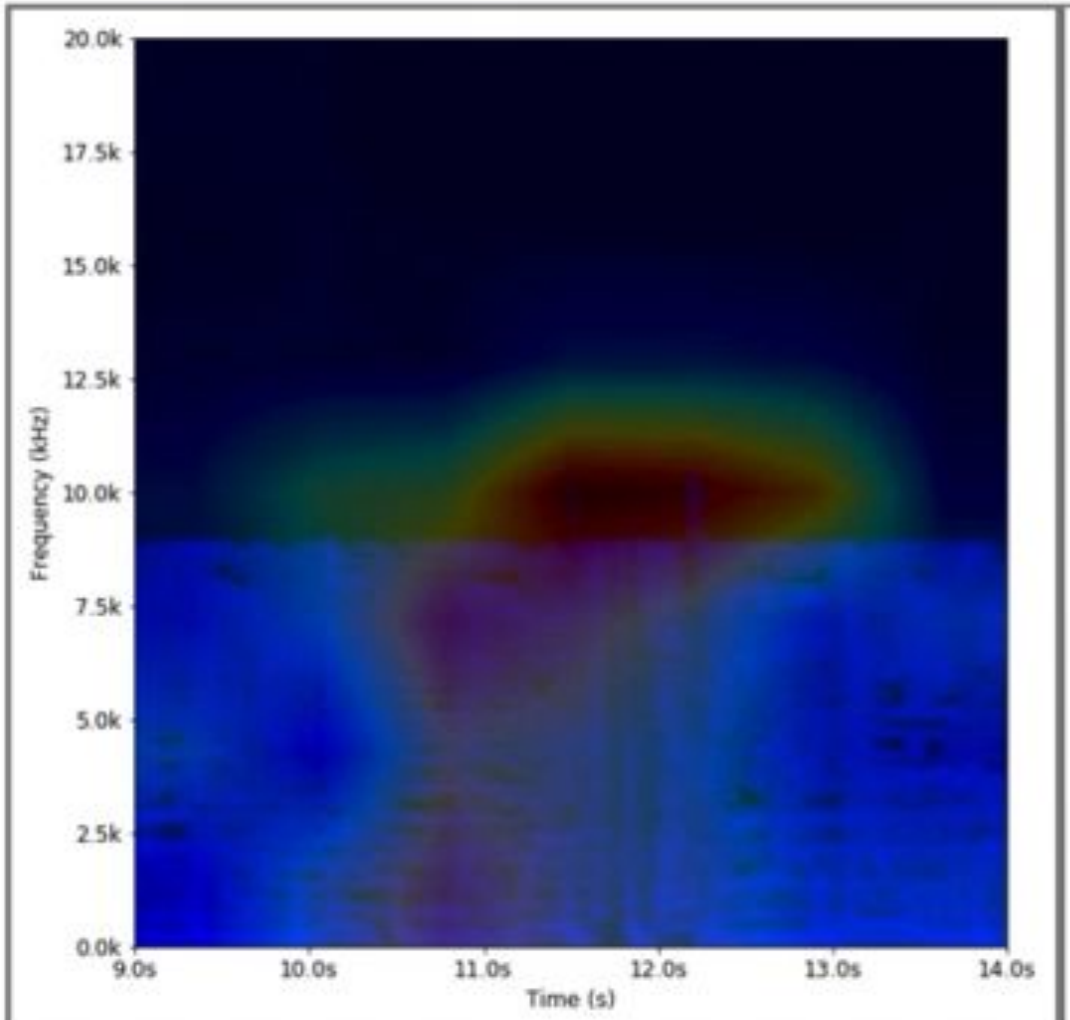


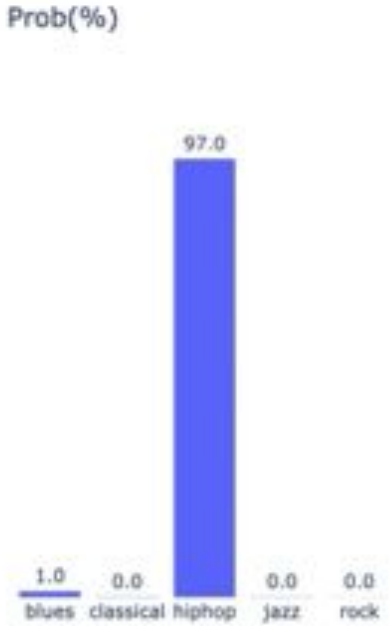
rock

prob:89.0%

demo_wav Quiz 2 0.0 / ... 35.0

搖滾一條龍！



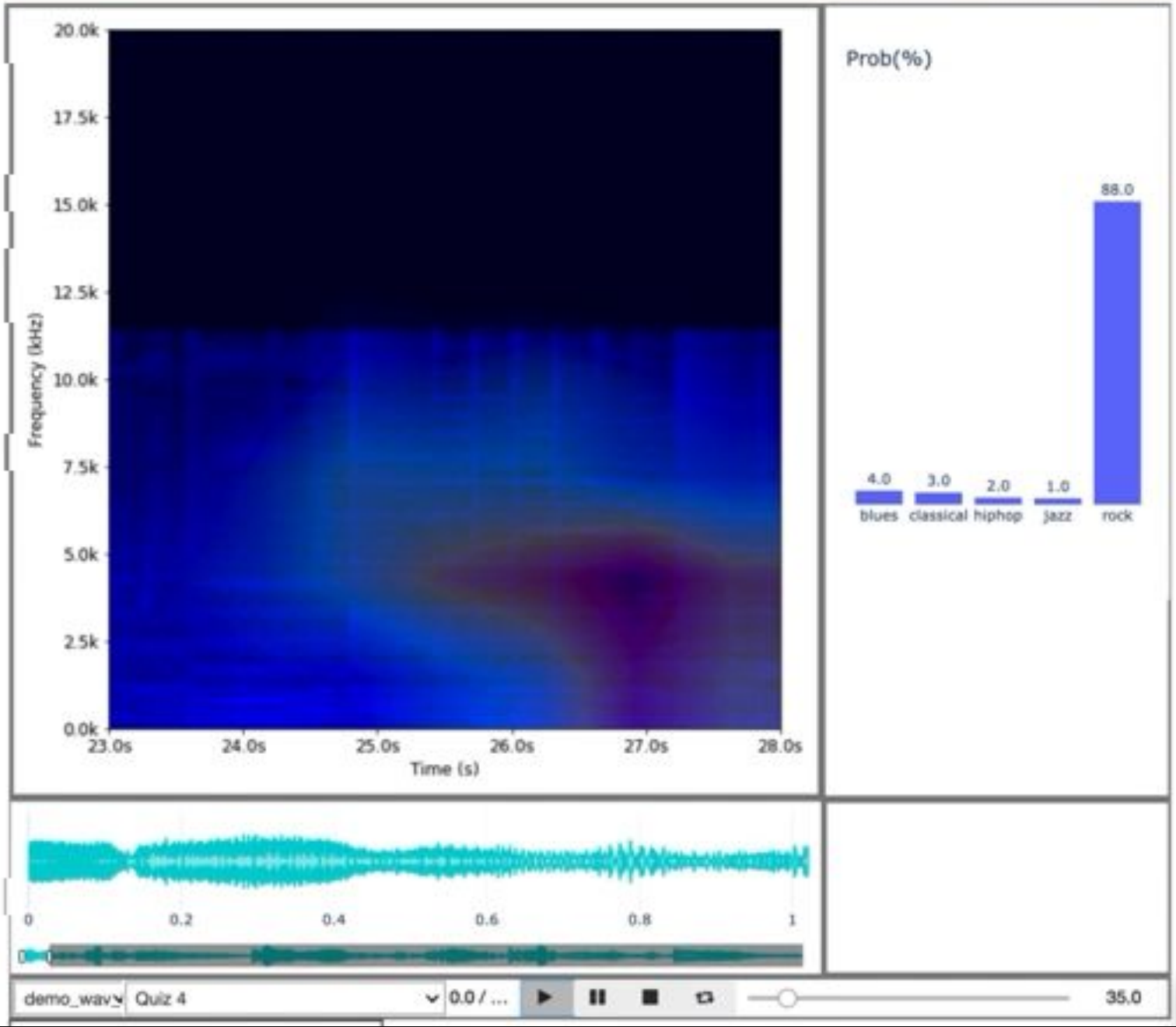


hiphop

prob:97.8%

demo_wav Quiz 3 0.0 / ... 145.0

搖滾一條龍！


20.0k
17.5k
15.0k
12.5k
10.0k
7.5k
5.0k
2.5k
0.0k
Frequency (kHz)
23.0s
24.0s
25.0s
26.0s
27.0s
28.0s
Time (s)
Prob(%)
88.0
4.0
3.0
2.0
1.0
blues
classical
hiphop
jazz
rock
0
0.2
0.4
0.6
0.8
1
demo_wav
Quiz 4
0.0 / ...
35.0

CONCLUSION

精準度

ResNet50 Transfer

87.2%

- STFT feature
- 5sec 聆聽時間

預測時間

LSTM RNN

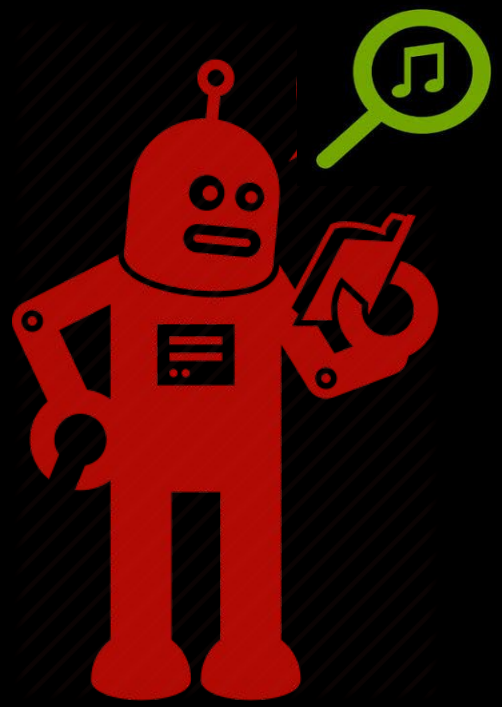
0.001s

- 未來能做到即時辨識應用

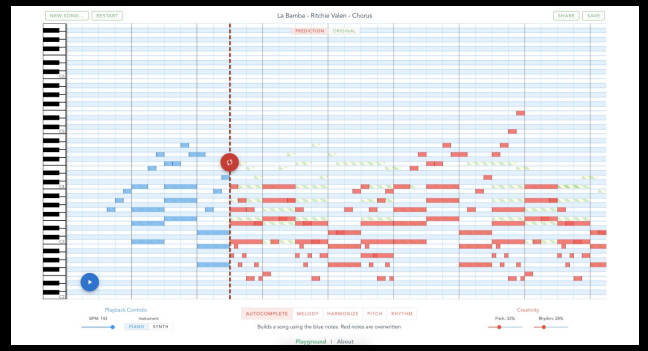
音樂風格生成創作的基礎模型

APPLICATIONS

AI 音樂教師

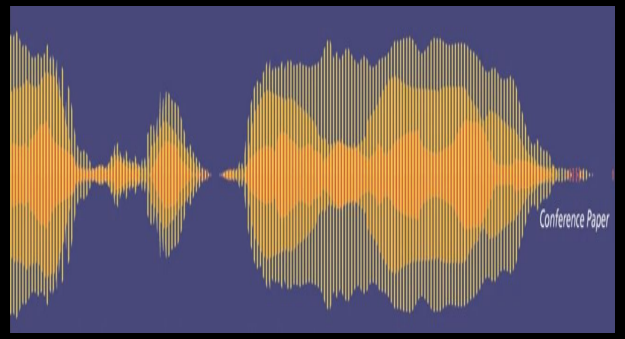


AI音樂風格生成



聲紋辨識

預測維護



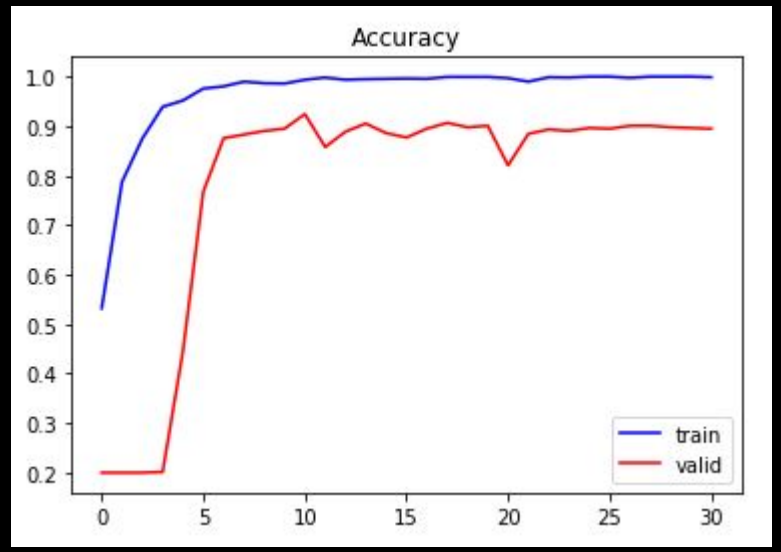
THANK YOU

✸許益誠 JT081003 ✸傅傳岩 JT081001 ✸吳冠承 JT081027

APPENDIX

MODEL RESULT

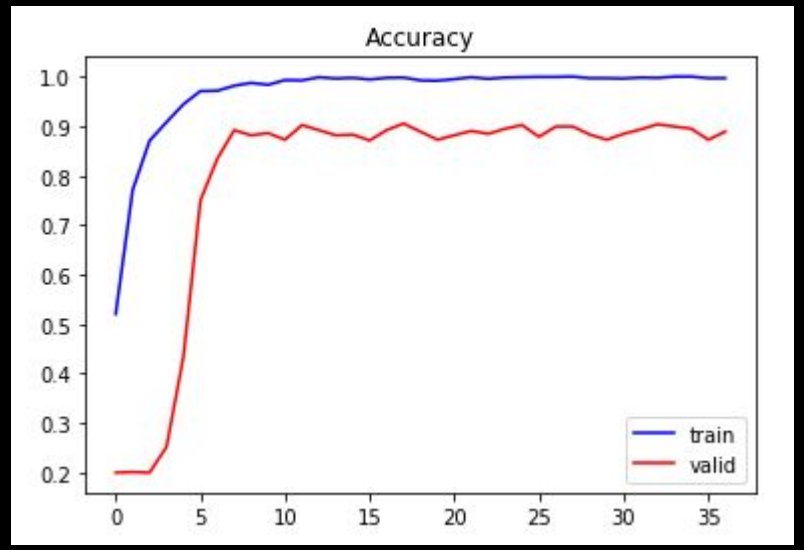
ResNet50 (STFT,time:5s)



	Blues	Classical	Hip Hop	Jazz	Rock
Blues	34	2	0	4	10
Classical	0	50	0	0	0
Hip Hop	0	0	50	0	0
Jazz	4	3	0	43	0
Rock	10	0	0	1	39

acc: 0.9937, val_acc: 0.9244, test_acc:0.864

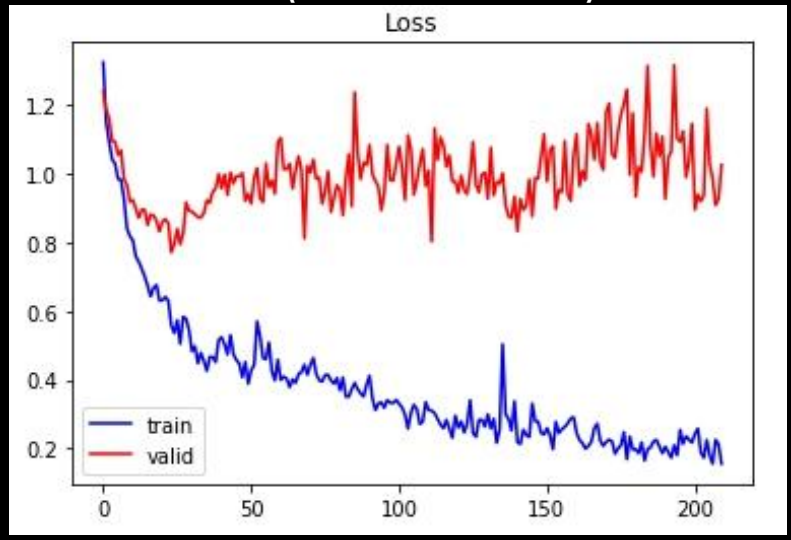
ResNet 50 (Mel,time:5s)



	Blues	Classical	Hip Hop	Jazz	Rock
Blues	41	0	0	6	3
Classical	0	50	0	0	0
Hip Hop	0	0	50	0	0
Jazz	3	0	1	46	0
Rock	9	1	0	0	40

acc: 0.9975, val_acc: 0.8919, test_acc:0.908

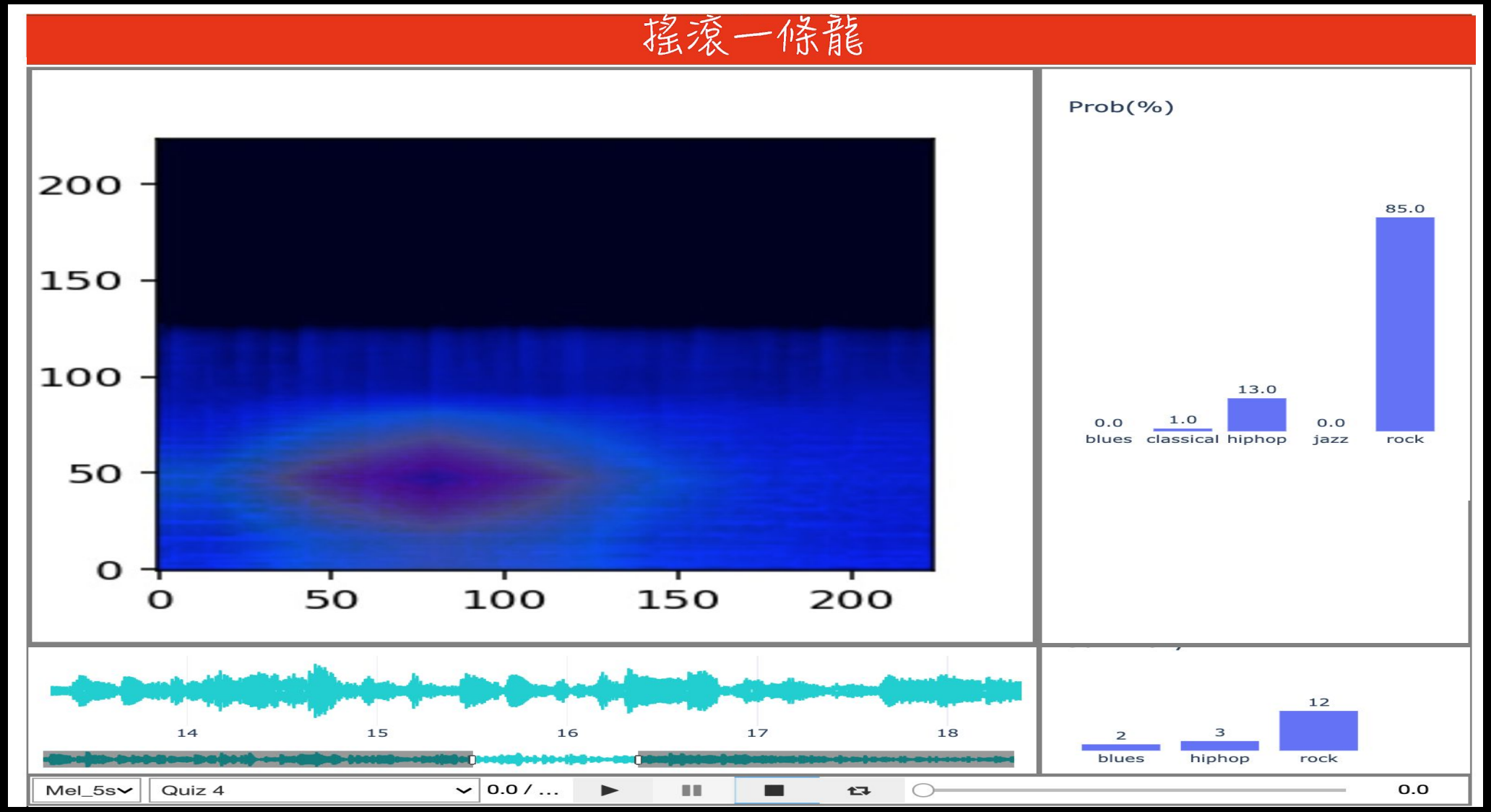
LSTM RNN (Mel,time:10s)



	Blues	Classical	Hip Hop	Jazz	Rock
Blues	18	0	5	0	1
Classical	0	24	0	0	0
Hip Hop	0	0	23	0	1
Jazz	0	1	0	23	0
Rock	4	0	1	2	17

acc:0.875

CAM PLAYER


搖滾一條龍
200
150
100
50
0
0
50
100
150
200
Prob(%)
85.0
13.0
0.0
1.0
0.0
blues
classical
hiphop
jazz
rock
14
15
16
17
18
12
2
3
blues
hiphop
rock
Mel_5s
Quiz 4
0.0 / ...
0.0

我成了一位二胡手

2013.9.21 於台北中山堂