DJ BOX



Automatic playlist generation

資工四 108AC1026 林寧

資財三甲 109AB0450 曹芷瑜













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Motivation & Goal







101 Motivation

Background music is crucial

for setting the right atmosphere in various situations



Manually creating playlists

time-consuming, and may not fit the desired ambiance

Pre-existing playlist

standardized and may not cater to individual needs

Personalization

Generation



Input specific occasion, mood, duration

Customized playlist suited to conditions

O2 Similar apps

2:54







O2 Similar apps

Youtube

Apple music

Spotify

Common function	推送歌單、歌單搜尋、曲風篩選、歌單分享										
preference	● 音訊和MV切換 ● 音樂收錄範圍廣	● 智慧播放清單 ● 接力播放 ● 多樣化播放清單	● 推薦機制 ● 共享合輯 ● annual wrapped								
difference	無法客製化長度、歌單中的曲目無法篩選										



App user interface & function







93 Function



選擇情緒

根據使用者的情緒 選擇歌單



Youtube播放

可以在 Youtube上播放 DJ Box 生成的歌單



選擇場合

根據使用者應用的 場合選擇歌單



智能歌單

根據使用者提供的條件 推送最合適的歌單



選擇時長

根據使用者需要的 時長選擇歌單



個人歌單

可以將喜歡的歌單收藏 至個人歌單中







選擇音樂風格

根據使用者喜好、需要場合等推薦適合歌單



跨平台播放

可以在 Youtube上播放 DJ Box 生成的歌單



智能歌單

根據使用者提供的條件 推送最合適的歌單



分享歌單

可以將歌單分享給其他 使用者



替換歌曲

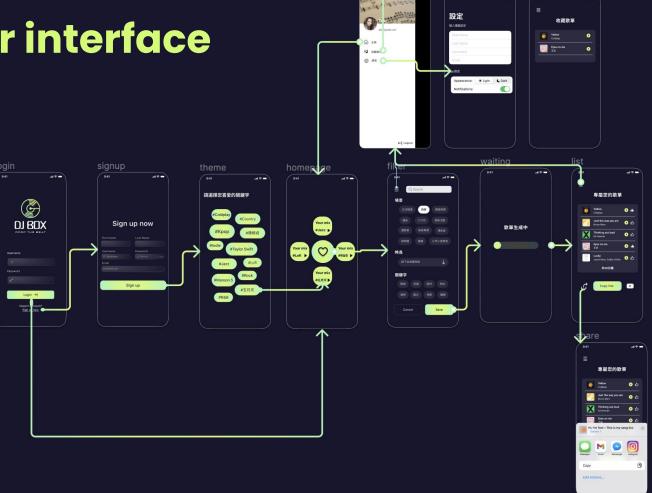
若使用者不滿歌單中的 曲目可要求系統替換



個人歌單

可以將喜歡的歌單或歌 曲收藏至個人歌單中

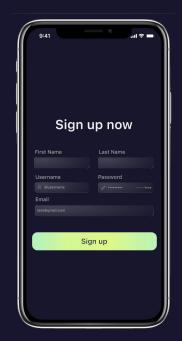
OB App user interface



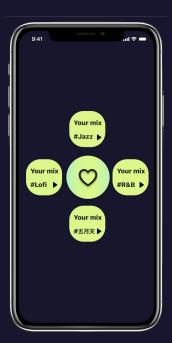
myList

03 DJ Box 雛形





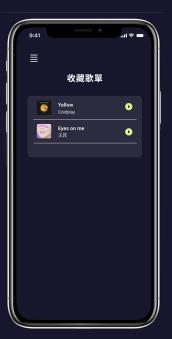




03 DJ Box 雛形



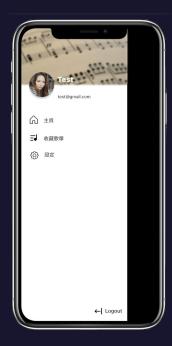






03 DJ Box 雛形



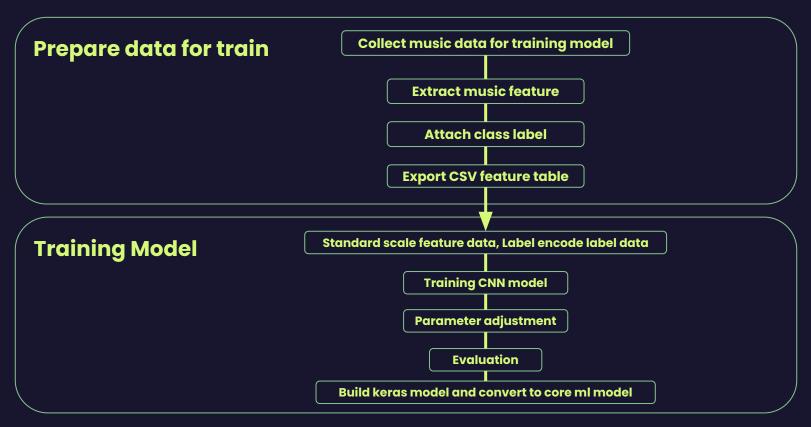


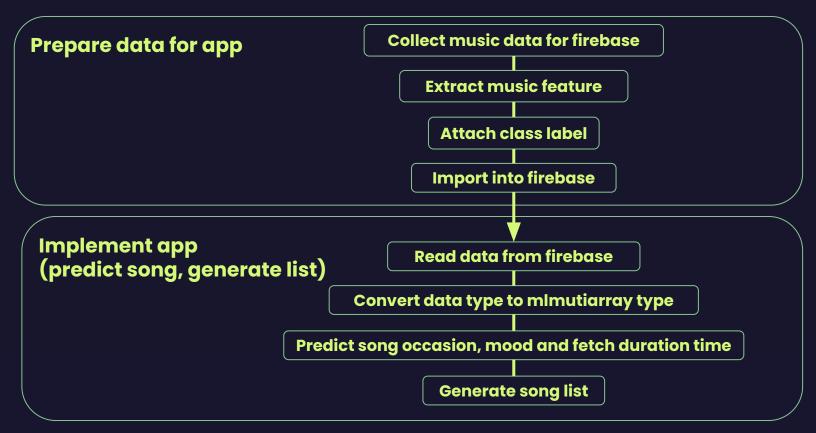




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Collecting a large amount of music data

Manually collect music data according to different scenes and moods on YouTube.





Extract music feature and attach label

Extract feature using Python and the Librosa library, such as Mel Spectrogram, spectral centroid, and many others, also attach label.

songs_feature.csv

00	mood_feature.es	ev.															Ď N ™	inters; 578
	Serane	centralid_mean	roleff_mean	flux,mean	mse_mean	217_W680	bandwidth_mean	feires, mean	nels_0_nees	nek_Lneen	mels_2_mean	mels_1_mean	neb_it_mean	mels_5_mean	mels_E_mean	mels_7_mean	mels_it_mean	meb_9_mee
0	happy_30_0_0	1845.8371542061548	3708-430679185896	1.3047192	0.041993746	9.08373647836538461	2005.274942213523	6.0111039937	0.331.08756	-2.351305	-1.631116	-6.890069	-5.241377	-6.284587	-9.388697	-11.169709	-12.559467	-14.487662
1	happy_20_0_1	2021.7431898852049	3958.796574529235	1.0627173	0.047257077	0.10548377403846154	2079.755452577790	0.000416628	-4.179386	0.65199125	1.1102979	-1.3599985	0.59348625	0.394306	-1.3223231	-3.3005152	-6.7608156	-7.1422205
2	happy_20_0_2	1972.0767648325063	3253.6053936298076	1.5414234	6.14876877	0.15214466049608461	1825.89115525126	0.3122896365	6.0340424	9.000371	0.9235615	6.9432964	4.3129925	4.124296	1.131742	4.1046117	-3.7329273	-9.249015
3	heppy_30_0_3	1812.1364609798074	3255.903132512819	1.5209752	6.13120872	0.09671349158653846	1862.1572244420176	6.813406053	4.732979	5.4553897	5.151999	5.9675293	6.3893924	5.6085167	2.318815	-5.8390776	-5.636307	-5.645291
4	heppy_30_0_4	2421.193505955648	4381.509915865385	1.6425042	0.067999944	0.1457294170673077	2135.52571246363	6.82972941	4.4793226	1.5873437	0.65556294	-4.0832995	-2.7737998	-1.8455125	-7.265842	-11.436781	-12.602611	11251612
5	happy_20_0_5	2399.674129204303	4058.394689052404	1.992444	0.14187922	9.14124949739615385	2071.994522052251	6.123755567	5.6149090	7.0395856	8.522112	6.756947	3.5181231	1.4797518	-3.7894466	-7.3848724	-11.227939	-12.907918
6	happy_20_0_6	2311.0279390409290	4413.975390570823	13000	0.0634199	0.13012905849038482	2177.1799794369395	6.33226208	-1.4281749	-0.21244625	0.5858373	-0.21307288	-0.0099496	-2.529324	4.2980987	-6.8634126	-9.549493	-10.488967
2	happy_30_0,7	3971.513460531014	2920.3064903646152	1.4668735	0.00295941	0.11047926682692308	1971.0546336242964	6.51324423	-8.93116665	6.830906	1.9831528	3.9294064	3.2074500	0.9025224	1.7582135	-2.5620143	-1.8903962	-3.9454994
	hepty, 10, 0, 6	2195.0877008477923	4157.6686448317305	1.3653433	0.07264630	0.123974609375	2025.0315050014802	6.817087948	-2.7483718	1.2271531	-0.85235451	2.4203458	0.26664653	2.0238638	0.655477	-1.4527547	-2.6590026	16,4144925
9	heppy_30_0_9	2122.7448807008554	3886.1634239783652	1.426433	6.0664753	0.12369290865384615	1963.6109902796686	6.114352656	-1.1999475	6.51594736	1.6464429	0.29577676	-0.9210002	1.4545914	0.53885525	-2.3196378	-4.5603995	+6.3979406
10	happy_30_0_30	1980.051214837839	3553.146221454327	1.4454939	6.099921795	0.11050180288461539	1953.318180472021	0.216550484	-1.3911797	-2.4997027	0.8942295	1.8898539	2.3594455	3.7973502	1.099901	4.33848	-6.415002	-9.245897
11	happy_20_0_11	1898.4408132445863	3453.842961237961	1.6895093	6.103720546	0.11280291408246154	1938.7717319637798	0.334996674	0.1665815	2.0450404	4.843495	4.1335225	0.795917	-1.5161353	-6.8423576	-7.016533	-7.338157	-7.431946
12	happy_30_0_12	1913/5251127121175	3524.571251582404	1.3135566	6.115917685	0.09643374399638461	1863.6961262654903	0.81533556	-8.9755979	3.274624	5.035130	6.0943065	4.7151613	3.6809642	4.7965597	-0.460377329	-3.922562	+4.2350403
13	hepty_10_0_13	2945.254073630563	3635.5683966346152	1.136722	0.06062159	0.11052000341346154	1904.4854200758505	6.121361926	-3.1141515	+1.5764225	-0.22262381	3.74(2)33	3.2939422	4.9412184	7.4549006	1.402256	-0.24363263	-3.0482783
14	happy_30_0_34	2178.122874810256	4314.508526141827	1.456213	6.058688927	0.12730929088538462	2132.5483604096958	6.04038794	4.09730334	-0.7979515	4.3466857	-3.521246	-2.862185	4.3067957	-3-3928561	4.181515	-6.631251	-8.406413
18	happy_20_0_25	2575.248244340176	5264.039963942306	2.15345	0.14888411	0.10127328725961539	2553.4988409583953	6.32404603	11.199114	5.356434	4.518629	2.751805	-1.0094383	-6.3282196	-5.547095	-6.2997894	-8.796977	-9.392941
16	happy_20_0_26	3565.5224384298895	5589.358971153846	2.050931	0.14187719	0.12590454329423077	2732.899686425067	0.326686115	13.020865	9.242484	3.8039658	0.035318285	-1.9279752	-6.369615	-5.9941704	-7.8320254	-6.54N0	-8.392718
13	happy_30_0_17	3034.776010238911	5936-307181490385	1.93566	6.15329215	0.15135236346153646	3553.440920949574	0.135996725	11.112983	5.968792	3.3429295	2.1279793	0.06408825	-6.4534135	-6.1243544	-7.69929	-6.551207	-5.319495
18	heppy_30_0_38	3003.090602386587	6054.225090517700	2.136436	0.14872933	0.13144905850951536	2765.480712167715	6.134363296	12.050453	10.794792	2.273172	-0.38381135	-1.9468731	-6.35742	-6.895048	-9.960792	-7.5916306	+5.7943557
19	heppy_30_0_29	2522.4360255614647	5326-072152944712	2.0968792	6.1933864	0.09871544471153847	2632.58655794437	6.124942032	12.126574	5.212967	6.457343	3.3202388	-0.20499006	-3.872176	-7.309868	-8.504807	-8.127971	-10.837988
20	happy_10_1_0	3263.3360682822736	6694.179931490385	2.0656456	6.13806903	0.15541240985574023	2897.6822851787306	6.055602323	13.723946	9.737119	3.7922338	-1.0514653	-2.59006	4.3663824	-6.5142996	-7.1394877	-6.8299226	4.0130987
21	happy_20_1_1	3588.595502135583	7042.365363339327	2.0095603	0.15569447	0.17902359774038463	2922.014925954738	0.06675764	13.843552	9.262004	3.626364	-1.435536	-3.7259433	-6.5999565	-7.197939	-2.414055	-5.7292743	-5.7237597
22	heppy 30.1.2	2925.55530125426757	6289.8547925692095	2.051329	0.1626263	0.11434795673079924	2832.0455675593563	6.837522536	15.090133	12.017933	6.6579644	-0.79909999	-1.0005500	-1.8356205	-3.4095045	-5.304295	-5.800391	-5.3605324
23	heppy, 30, 1, 3	2977.496711190487	6456.068390935896	2.000655	0.16158344	0.12333606774038461	2895.994189445298	6.045874642	13.696432	10.136566	7.096279	2.1595999	0.16165013	-2.4546824	-5.0350423	-5.524496	-3.7615166	4.2927315
24	heppy, 30, 1, 4	3229.00643333783067	6794.177997295673	1.796841	6.13729888	0.1343712439903848	2901.1380687736867	0.048845852	13.423435	10.338396	5.585266	-1.3526495	-4.2079004	-6.512604	-6.615813	-9.782941	-6.538629	-7.997581
29	happy_10_1_5	3557.8251.19443815	6994.0651292067305	1.7512615	0.1480967	0.19177909495192308	2860.4499979562024	6.27955248	9.265623	5.49079	7.5242314	0.48089065	-1.7934942	-3.4740503	-5.89251	-5.3208150	-2.7977812	-2.546963
26	heapy 30, 1, 6	3064.5279423327945	6609.130106173677	1.2992793	6.17931369	0.13315805288461538	2945.233254458247	0.06257515	13,369986	10.545079	0.053546	6.2955292	6.341997	3.8357931	1.0260262	1.3029069	2.319133	0.6123976
20	heppy, 20, 1, 7	3460.593044435357	7259.174053485577	1.3703006	0.10055879	0.17740272235576923	3021.630223043146	0.0755450	11.022394	9.502723	11.494573	5.0049995	6.1536635	4.440297	0.9924317	0.60973465	1.8660011	8.4325949
28	heppy, 30, 1, 6	3381,654196532364	7291.0597581.129805	1.3659962	0.1825088	0.18524929903846153	3056.62405361396	6.87151839	13.496084	10.346913	9.493695	4.565855	5.769244	2.7480242	0.072391465	1.7529937	2.2972967	1.0008373
29	hassy 30 1 9	3374-4625552666763	#990.\$2003#5552WI	1.396(23)	6.11972538	0.17737379802992308	2904.6225368613164	0.08339536	11.236967	7.336044	5.191729	6.35895	4.6580995	3.2613132	2.172951	0.892626	3.0160313	1.4290883
30	Name 20 1 20	3160.3298249994458	6680,179349499135	1.3805141	0.17493145	0.1622659074529231	2841.510089084077	0.07582343	12,510485	9.397234	6.245961	9.490187	SAUMINIS	4.013343	2.4868886	3.3295851	2.415053	0.8402729
31	heapy 20 1 11	3455,655945938914	7349.530086596558	1.2262501	6.17349257	0.17623572716246153	3023.6468966029633	0.29472897	11,599234	8.828367	9.039925	6.36906	5.7725962	4.9729915	2.2501725	3,7009448	3.6169288	2.066963
32	heppy, 30, 1, 12	3277.3067938779633	7110.925232971154	1.332937	6.19643223	0.15134840745192387	3012.039497772304	6.07921212	12,958973	11.587959	12.1005125	7.1997943	5.512191	5.493861	1.8983579	3.3563276	2,7300666	3.1799017
33	heppy, 30, 1, 13	3453,279534625305	7429.534818299135	1.3309367	6.17720695	0.18376277943268232	3075.953445449779	0.09049482	11.637393	10.376431	8.953466	7.6278872	7.946765	3.2872484	2,7090986	2.3865178	3.0521653	8.7364538
34	Name 10 1 16	3637.6212352661716	7341-145865386615	1.3590652	0.10946518	0.17090970912894606	3033.80492841534	0.08399994	12.162313	8.483804	7.264206	6.8214994	3.636116	6.1928683	0.81992096	1.6681129	2.5561833	1.5665582
20	1800V 20 1 15	3365.2437953263800	2000.001189903840	1.3268812	6.16624992	0.17346754807692308	2956.841049429031	0.28484252	11,294599	9.275968	5.82611	8.826267	3.791106	6.2940922	2.6222909	3.8936773	2.5187202	1.3611288
26	1499Y 20 1 20	2790.44724742512			0.091503034	0.13003305200401339		0.00020000	1.5923331	1.6007038	-1.399962	0.302233526	-2.6979457	-4.8828955	-5.204228	-3.3400000	-5.6126485	-9.261227
32	heppy, 30, 1, 17	1551.1402258879954		1.6719914	6.05736034	0.0549091045873879894	1912 1465104745366	6.811021056	2.3013315	-5.438283	-9.556733	-13.534503	-16.474556	-17.97682	-19.68295	-21,796676	-23.01612	-24.222406
34	hanny 10 1 15	2245 5249252257338			6.15862983	0.12120983173620923			11.720017	10.306429	6.589029	5.1602977	2.030006	14.129886	-2.8554499	3.645395	-0.8566652	-0.0275355
-	happy 30 1 39	3784 3441333418043				0.1201000000000000000000000000000000000			12 273400	10.00361	3.734483	0.000100	1 10000	-3.7330663	-3.0933843	-3 3456135	-4 7307036	-5.073646

04

Methods and Techniques

Training data by CNN Model

Training mood dataset and occasion dataset into cnn model by tensorflow keras.

```
# 建立神經網絡架構
model=keras.models.Sequential([
    keras.layers.Flatten(input_shape=(X.shape[1],)),
    keras.lavers.Dropout(0.2),
    keras.layers.Dense(512, activation='relu'),
    keras.lavers.Dropout(0.2).
    keras.layers.Dense(256, activation='relu'),
    keras.lavers.Dropout(0.2).
    keras.lavers.Dense(128, activation='relu'),
    keras.layers.Dropout(0.2),
    keras.lavers.Dense(64. activation='relu').
    keras.layers.Dropout(0.2),
    keras.lavers.Dense(32. activation='relu').
    keras.layers.Dropout(0.2),
    keras.layers.Dense(8, activation='softmax'),
1)
```



Mood CNN Model

The best accuracy is: 97%

Occasion CNN Model

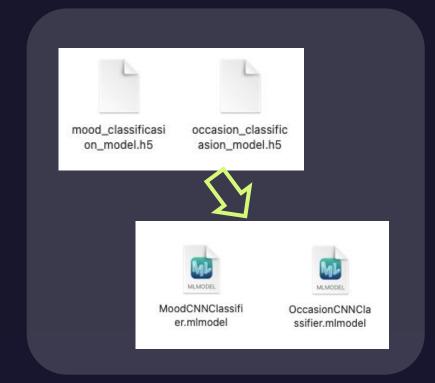
The best accuracy is: 80%





Convert Model to CoreML Model

Use coremitoos to convert model.



Firebase Data Convert into MLMultiArray CoccasionCN NClassifier Classifier Classifier Classifier

Use CoreML on DJ Box

Implementing a user interface on the iOS platform.

```
// 篩選出符合 occasion condition 的 song
if let occasionPrediction = ClassifyOccasion(tensorInput) {
    if occasionPrediction.Identity[occasion.identity()].floatValue > 0.7 {
        print("occasion > \(song.title):\(occasionPrediction.Identity[occasion.identity()].floatValue)")
        // 篩選出符合 mood condition 的 song
        if let moodPrediction = ClassifyMood(tensorInput) {
           if moodPrediction.Identity[mood.identity()].floatValue > 0.8 {
               print("mood > \(song.title):\(moodPrediction.Identity[mood.identity()].floatValue)")
               // 找出最贴近 duration 的 song
               if let songDuration = Int(song.duration) {
                   // 目前 recommend song list 中的總長度
                   let curDuration = self.recommendSongs.map { Int($0.duration) }.reduce(0, +)
                   if abs(duration - (curDuration + songDuration)) <= abs(duration - curDuration) {
                       if let song_id = song.id {
                           self.recommendSongs.append(Song(id: song_id, title: song.title, duration: songDuration, url: song.url))
                           print("Current Duration: \(curDuration + songDuration)")
```

WebKit

Playing youtube video directly in the app

```
import SwiftUI
import WebKit
struct ListView: View {
   @EnvironmentObject var songManager: SongManager
   @EnvironmentObject var songListManager: SongListManager
   @State private var newSongList = SongList()
   @State private var showAlert = false
   var body: some View {
      ZStack {
          Color(red: 23/255, green: 22/255, blue: 46/255)
              .ignoresSafeArea()
          VStack {
             Title(iconName: "music.note.list", title: "專屬您的歌單")
             ScrollView(.vertical) {
                 LazyVStack(spacing: 20) {
```



Demo

2:54











05 Demo





Problem&Solution

2:54





Problem&Solution

1. Youtube video can't play on the DJ Box.

Try to connect with Youtube Data API, it's can only show the information of music. Can't play directly.

Solution

Use the WebKit - WKWebView to play directly.



Problem&Solution

2. Accuracy is to low.

Accuracy was below 50% the first few times.

Solution Increase the training data as possible.

Collected double Mood & Occasion song of playlists.





Thank you for listening