Project Based Learning Report

on

Real-time Lane Line Detection in Python

Submitted in the partial fulfillment of the requirements
For the Project based learning in (**Essentials of Data Science**)
in
Electronics & Communication Engineering

By

2014111084 Yash Natrajan
2014111100 Divyanshu Ranjan
2014111098 Priyanshu Rakesh

Under the guidance of Course In-charge

Prof. Dnyanesh S.Lavhkare

Department of Electronics & Communication Engineering

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering,
Pune – 4110043

Academic Year: 2021-22

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering,
Pune – 411043

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the Project Based Learning report entitled, **"Build a song recommendation model using Machine Learning."** is work done by

2014111084 Yash Natrajan
2014111100 Divyanshu Ranjan
2014111098 Priyanshu Rakesh

in partial fulfillment of the requirements for the award of credits for Project Based Learning (PBL) in **Essentials of Data Science Course** of Bachelor of Technology Semester IV, Electronics & Communication Engineering.

Date: 23 May 2022

Prof. Dnyanesh S.Lavhkare
Course In-charge

Dr. Tanuja S.Dhope
PBL Co-Ordinator

Dr. Arundhati A.Shinde

Professor & Head

ELECTRONICS & COMMUNICATION ENGINEERING

Index: -

Problem Statement :-

In cases like a new user or a cold start, automatic playlist continuation can be a major issue as there is not enough data for the model to compile and suggest new tracks for the playlist.

Solution :-

A common approach to build the *background knowledge* of the music catalog for playlist generation is using machine learning techniques to extract that knowledge from manually curated playlists.

The assumption here is that curators of these playlists are encoding rich latent information about which tracks go together to create a satisfying listening experience for an intended purpose.

Some proposed APG and APC systems are trained on playlists from sources such as online radio stations, online playlist websites and music streaming services. In the study, the names of playlists on Spotify were analyzed to create contextual clusters, which were then used to improve recommendations.

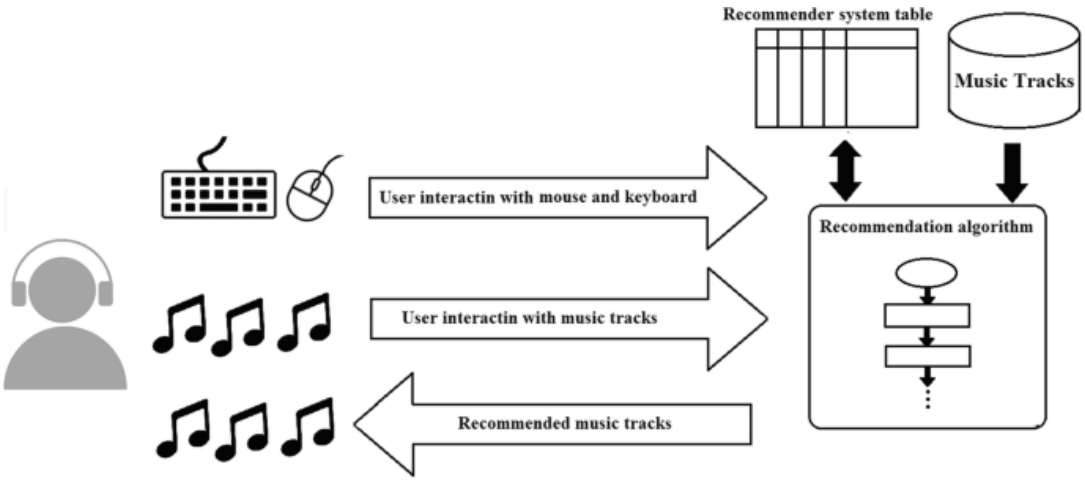
An approach to specifically address song ordering within playlists is the use of generative models that are trained on hand-curated playlists. McFee and Lanckriet represent songs by metadata, familiarity, and audio content features, adopting ideas from statistical natural language processing.

Another solution to cold start is cross-domain recommendation techniques, which aim at improving recommendations in one domain (here music) by making use of information about the user preferences in an auxiliary domain. Hence, the knowledge of the preferences of the user is transferred from an auxiliary domain to the music domain, resulting in a more complete and accurate user model.

Similarly, it is also possible to integrate additional pieces of information about the (new) users, which are not directly related to music, such as their personality, in order to improve the estimation of the user's music preferences.

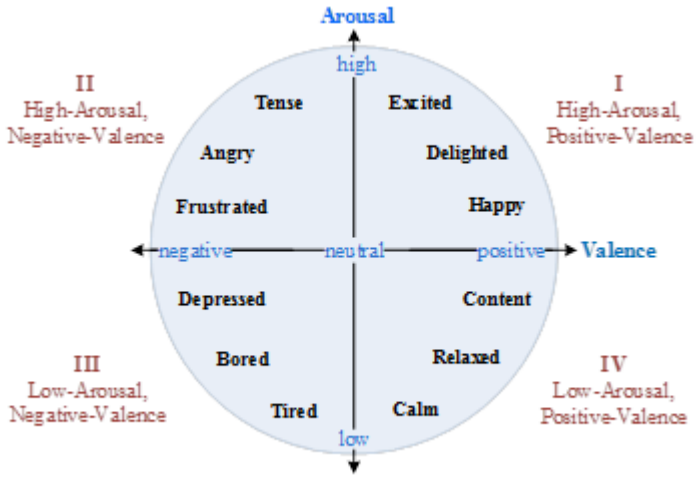
Music Recommendation System:

An unsupervised machine learning model which analyses playlists and gives recommendations. We created this project to see if we can actually understand the musical patterns of a listener with their playlist as source and what factors are really useful in determining the taste and interest of a user.



This model focuses on building an automated system that recommends music on the sub selection of artists, genre, mood, popularity and recent tracks that the user has listened to.

The given mood bar is also taken into consideration when recommending songs to the user. If the user well interacts with a suggested track then the algorithm immediately starts spamming the playlist with new recommendations and ones that the user can understand.



Dataset: The dataset consists of more than 40,000 tracks of various genres.

Libraries Used-:

- NumPy
- Pandas

The data sets and metadata that was used in the project is available on GitHub in the readme file connected to the google drive.

GitHub Link:

https://github.com/yash-natrajan/music-recommendation-system

Software Used: -

Jupyter -

The Jupyter Notebook is an open-source web application that allows data scientists to create and share documents that integrate live code, equations, computational output, visualizations, and other multimedia resources, along with explanatory text in a single document. You can use Jupyter Notebooks for all sorts of data science tasks including data cleaning and transformation, numerical simulation, exploratory data analysis, data visualization, statistical modeling, machine learning, deep learning, and much more.

A Jupyter Notebook provides you with an easy-to-use, interactive data science environment that doesn't only work as an integrated development environment (IDE), but also as a presentation or educational tool. Jupyter is a way of working with Python inside a virtual "notebook" and is growing in popularity with data scientists in large part due to its flexibility. It gives you a way to combine code, images, plots, comments, etc., in alignment with the step of the "data science process." Further, it is a form of interactive computing, an environment in which users execute code, see what happens, modify, and repeat in a kind of iterative conversation between the data scientist and data. Data scientists can also use notebooks to create tutorials or interactive manuals for their software.

Result with Analysis

```
testing = Y.iloc[6:12]['track_id']
```

In [32]:

```
testing
```

Out[32]:

```
9610     43754
10774    50432
6193     25380
9095     40780
9158     40943
8442     37322
Name: track_id, dtype: int64
```

In [33]:

```
ids = testing.loc[testing.index]
```

In [34]:

```
songs = metadata.loc[testing.loc[list(testing.index)]]
```

In [35]:

```
Songs
```

Out[35]:

track_id	album_title	artist_name	genre	track_title
43754	Modluv	Sans Blanc	AvantGarde|International|Blues|	Rien n'aiment
50432	Watchmaker: Co-Axial Escapement	Eaters	AvantGarde|International|Blues|	Workings
25380	iHyper	Zinger	Electronic	rhino sting
40780	You, Me & The Werewolves EP	E.lebleu	Electronic	Polynesian Rush feat. Rugoso
40943	Live on WFMU's Cherry Blossom Clinic with Terr...	Parting Gifts	Rock	Keep Walking
37322	Live on WFMU's Inner Ear Detour, Oct 1st 2010	Už Jsme Doma	Rock	Puklinka (Cranny)

In [36]:

```
re = predict(t, Y.iloc[6:12])
```

In [37]:

```
output = recommend(re, metadata, Y.iloc[6:12])
```

In [38]:

```
ge_re, ge_ar, ge_mix = output[0], output[1], output[2]
```

In [39]:

```
ge_re.head()
```

Out[39]:

track_id	album_title	artist_name	genre	track_title
1574	Please Throw Me Back in The Ocean	Sir Lord Von Raven	AvantGarde|International|Blues|	The Glass Castle
1575	Please Throw Me Back in The Ocean	Sir Lord Von Raven	AvantGarde|International|Blues|	Take it or Leave it
1892	Tommy Jay's Tall Tales Of Trauma	Tommy Jay	AvantGarde|International|Blues|	I Was There
3394	Live at WFMU on Liz Berg's Show on 5/19/2008	Bonde Do Role	AvantGarde|International|Blues|	Gasolina / Contamida
3396	Live at WFMU on Liz Berg's Show on 5/19/2008	Bonde Do Role	AvantGarde|International|Blues|	Solta o Franco

The Output Screen is on GitHub

Link:

https://github.com/yash-natrajan/music-recommendation-system/blob/main/Music%20Recommendation%20System%20(Machine%20Learning).ipynb

Project Outcome:

In this project we learnt about using Jupyter for Machine Learning and how you train the system with better algorithms, good code and user data.
We built a system that auto recommends songs across cross-domains that enhances user experience.

Project Conclusion:

The initial question of the project was if we could determine the musical resemblance in the user's choice of songs and playlists. The answer is yes we can. It is just a matter of correct algorithms and the right metadata or a source that can provide sufficient information.