IBM Innovation Center for Education

PHEMESOFT Software That Matters
TRUSTED DELIVERY PARTNER for IBM ICE

UPES UNIVERSITY OF TOMORROW

AI-Powered Music Recommendation System

PROJECT SYNOPSIS ON

Build an AI-powered recommendation system for a music streaming platform

MASTERS OF COMPUTER APPLICATION
AIML

SUBMITTED BY:

NAME	SAP ID
Akash Panwar	500106837
Omji Shukla	500100963
Tanishka Chandola	500104885
Abhishek Kumar	500106851
Deepesh Singh	500106971

GUIDED BY:

Dr. Kavitha

AI-powered recommendation system for a music streaming platform

NAME	DETAILS
Akash Panwar	Roll : R271222054 Add. : UPES, Dehradun Email : akashpanwar9976@gmail.com Contact : 9997640346 Branch : MCA AIML
Omji Shukla	Roll : R271222037 Add. : UPES, Dehradun Email : omshukla245@gmail.com Contact : 8178858705 Branch : MCA AIML
Tanishka Chandola	Roll : R271222016 Add. : UPES, Dehradun Email : Chandolatanishka@gmail.com Contact : 8394960848 Branch : MCA AIML
Abhishek Kumar	Roll : R271222052 Add. : UPES, Dehradun Email : abhi.kr.1307@gmail.com Contact : 8210580073 Branch : MCA AIML
Deepesh Singh	Roll : R271222058 Add. : UPES, Dehradun Email : letsmaildeepesh@gmail.com Contact : 6394462544 Branch : MCA AIML

Table of Contents

Introduction

The emergence of digital music streaming platforms has revolutionized the ways in which individuals find, listen to, and engage with music. With millions of music at their fingertips, people frequently struggle to search through enormous libraries for content that suits their tastes. Our project intends to construct an AI-powered recommendation system for a music streaming platform in order to overcome challenges and improve user experience.
In order to offer consumers individualized recommendations based on their listening history, preferences, and activity, the recommendation system will make use of machine learning algorithms and data analytic approaches. The technology creates customized playlists, helps users find new music, and helps them rediscover old favorites by tracking user interactions such as song plays, likes, dislikes, and playlists generated.

The following are the main goals of the recommendation system project:

Personalized Recommendations: Create algorithms that examine user information and produce recommendations that are specific to each user's tastes and listening patterns.

Enhanced User Experience: Provide timely and pertinent recommendations that match users' interests and musical preferences to increase user satisfaction and engagement.

Content Discovery: By highlighting lesser-known musicians, genres, and songs that people might like based on their preexisting tastes, you can help consumers find new content.

Scalability & Performance: Create an effective and scalable recommendation system that can manage substantial amounts of user data and deliver recommendations in real time with low latency.

Adaptability and Evolution: Construct a versatile and adaptable recommendation system that has the capacity to continuously pick up new skills and adjust to changing user tastes and market trends.

Literature survey

1. "Deep Learning Based Music Recommendation System Using Triplet Loss" by Yoon et al. (2019) - This paper proposes a deep learning-based recommendation system using triplet loss to learn music embeddings for personalized recommendations.

2. "Neural Collaborative Filtering for Personalized Music Recommendation" by He et al. (2017) - This paper introduces a neural collaborative filtering model for music recommendation, which combines matrix factorization and deep learning techniques.

3. "Content-based Music Recommendation via Hybrid Neural Networks with Feature Projection" by Li et al. (2020) - The authors propose a hybrid neural network model for content-based music recommendation, incorporating both user-item interaction data and content features.

4. "Hybrid Music Recommendation via Latent Factor and Discriminative Feature Learning" by Liu et al. (2018) - This paper presents a hybrid recommendation system that combines latent factor models with discriminative feature learning for music recommendation.

Methodology/ Planning of work

- **Planning the Project and Analyzing the Needs:**
  Consult with stakeholders to define the needs, goals, and scope of the project.
  List the essential characteristics and aspects of the recommendation system.
  Make a project plan that includes deadlines, goals, and the distribution of resources.

- **Gathering and preparing data:**
  Obtain information on user interactions from the music streaming service, such as listening preferences, playlists, reviews, and user profiles.Clear out duplicates, deal with missing numbers, clean up the data, and prepare it for analysis.To obtain insights, examine the data using descriptive statistics and visualization approaches.

- **Engineering Features:**
  Gather information from the data that will help you create user and object profiles.
  Take into account attributes like user demographics, popularity, genre, artist, and temporal patterns.

- **Model Design and Selection:**
  Based on the needs of the project and the properties of the data, select the best recommendation algorithms.Create the recommendation system's architecture, taking into account the representation and updating of user and item profiles.

- **Deployment and Integration:**
  Include the trained recommendation models in the backend infrastructure of the music streaming service.Install the recommendation system in a live setting, making sure it performs, scales, and is reliable.

- **Observation and upkeep:**
  Put monitoring tools in place to keep an eye on the recommendation system's performance in real time.To find any problems or potential areas for improvement, keep an eye on important metrics and user input.
  To make sure the models continue to work over time, periodically retrain them with updated data.

- **User Evaluation and Input:**
  To get input on the functionality and performance of the recommendation system, test it with actual users.Iteratively enhance the user experience and recommendation algorithms by taking user feedback into account.

Facilities required for proposed work

Software prerequisites:

Languages Used in Programming:
Python: A popular language for data processing and machine learning applications.
SQL: For database management and querying to retrieve information about user interactions.
Shell scripting: For resource management and task automation.

Libraries and Development Frameworks:
For creating and refining neural network models for recommendations, use TensorFlow or PyTorch.
Scikit-learn: For applying assessment metrics and machine learning techniques.
For data processing and numerical calculations, use NumPy and Pandas.
Flask or Django: For creating web services and backend APIs that connect the music streaming network and recommendation system.
Large-scale recommendation model training and distributed data processing are two uses for Apache Spark.

Tools for Development:
an Integrated Development Environment (IDE) for coding, debugging, and testing machine learning models, such PyCharm, Visual Studio Code, or Jupyter Notebook.
Git or alternative version control systems to facilitate team member cooperation and source code management.
For managing dependencies and guaranteeing the development environment is reproducible, use Docker or virtual environments.

Hardware prerequisites:

Computer Resources:
High-performance CPUs or GPUs: To effectively train deep learning models.
Memory (RAM): Enough memory to manage big datasets and training models.
Storage: Sufficient space to hold model checkpoints, datasets, and other project files.

Creating a network:
dependable internet access to download datasets, use cloud services, and work remotely with colleagues.