**Regular project Questions**

**Task:  Movie Recommendation System Development**

**Objective:**This project focuses on building a robust recommendation system using the MovieLens dataset to enhance personalized movie suggestions for users.

**Requirement 1: Data Loading and Preprocessing**

**Dataset: https://drive.google.com/drive/folders/1SD0E0e46TOSKum29vjubsmWWd6mZSV9s?usp=sharing**

* The MovieLens dataset is a popular benchmark dataset for recommender systems, containing user ratings, movie metadata, and tags, designed to support research in collaborative filtering, content-based filtering, and hybrid recommendation algorithms.

**Tasks:**

1. Load the MovieLens dataset and perform exploratory data analysis (EDA) to understand user preferences and movie features. Handle missing data through imputation or removal, ensuring the dataset is clean and ready for further analysis. This step includes merging necessary datasets and visualizing key insights to uncover patterns in ratings and movie popularity

**Deliverables:**

* A Jupyter Notebook documenting the dataset loading, EDA process, visualizations (e.g., rating distribution, most-rated movies), and steps taken for data cleaning and handling missing values.

**Requirement 2: Collaborative and Content-Based Filtering Models**

**Tasks:**

1. Implement recommendation models using both collaborative filtering (user-based and item-based) and content-based filtering approaches. Use cosine similarity to measure similarities between users, items, and movie features. Content-based filtering should employ TF-IDF to analyze movie genres. Ensure modularity in the implementation of models for ease of comparison and potential integration into a hybrid system.

**Deliverables:**

* A Jupyter Notebook showcasing the implementation of collaborative and content-based filtering models, with detailed explanations of the algorithms, similarity measures, and outputs (e.g., similarity matrices and sample recommendations).

**Requirement 3: Hybrid Recommendation System and Evaluation**

**Tasks:**

1. Combine the collaborative filtering and content-based filtering models into a hybrid recommendation system. Develop a method to provide personalized movie recommendations using the hybrid approach. Evaluate the performance of the recommendation system using metrics like Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE), and document the findings to compare model accuracy and effectiveness.

**Deliverables:**

* The Notebook and A PDF document summarizing the hybrid model's design, implementation process, evaluation results (MAE and RMSE), and recommendations for potential improvements. Include visuals and comparisons of metrics to illustrate the hybrid system's effectiveness.

**Requirement 4 : Collaborative Filtering Using SVD with Cross-Validation (Optional)**

**Tasks:**

1. implement collaborative filtering using Singular Value Decomposition (SVD) with the Surprise library. The goal is to build a recommendation model that predicts user ratings for items and evaluates the model using cross-validation. The process includes loading and preparing the dataset, and training the model on the full dataset for final predictions. Key metrics like RMSE and MAE are used to evaluate the model's accuracy. Suggest how to improve the Model Prediction

**Deliverables:**

* Code Implementation:
* A well-documented Jupyter Notebook containing:
* Dataset loading and preprocessing steps.
* SVD model implementation using the Surprise library..
* Model training on the full dataset.
* Predictions for specific user-item pairs, with explanations . Pdf document : Strategies for Enhancing Model prediction