Status Update: Movie Recommendation System

Project Overview

Our project focuses on developing a **movie recommendation system** using the **MovieLens dataset**. The dataset includes a collection of movies and user ratings, which we will leverage to build a **neural network-based recommendation model**. Our implementation will primarily use **Python** and **PyTorch**.

Progress So Far

Technology Investigation

- We have researched **PyTorch** as our deep learning framework and its capabilities for recommendation systems.
- Explored the **MovieLens dataset** structure, including movie metadata, user ratings, and tags.
- Reviewed existing collaborative filtering and deep learning approaches for recommendation systems.

Challenges Identified

- **Data sparsity**: The user-item interaction matrix has many missing values, which could impact training.
- **Computational complexity**: Training deep learning models on large datasets requires efficient resource management.
- **Cold start problem**: Recommending movies to new users without sufficient rating history.

Next Steps

- Implement a **baseline collaborative filtering model** (e.g., matrix factorization) to test initial recommendations.
- Experiment with **neural network architectures**, such as autoencoders and embedding-based models.
- Fine-tune the neural network architecture and optimize hyperparameters.
- Explore **hybrid recommendation techniques**, such as combining content-based and collaborative filtering.
- Implement an **API** for user interaction.
- Evaluate model performance using metrics such as **RMSE, precision@k, and recall@k**.