Collaborative Filtering Recommender System

This project implements a modular, script-based movie recommender system using the MovieLens 100k dataset.   
It features User-Based Collaborative Filtering, Item-Based Collaborative Filtering, and Matrix Factorization (SVD).  
Recommendations are enriched with movie titles and genres using metadata from the dataset.  
  
Users can interact with the models through a user-friendly Streamlit web app.

# Project Structure

CollaborativeFiltering\_Recommender/  
│  
├── main.py # Runs full model pipeline end-to-end  
├── streamlit\_app.py # Streamlit web interface for recommendations  
├── requirements.txt # Python dependencies  
├── README.md # Documentation  
├── LICENSE # MIT License  
│  
├── data/  
│ ├── raw/ # Place 'u.data' and 'u.item' files here  
│ └── processed/ # Processed ratings stored as CSV  
│  
├── outputs/ # Recommendation results and predictions  
│  
├── src/  
│ ├── data\_loader.py  
│ ├── evaluation.py  
│ ├── metadata\_loader.py  
│ ├── matrix\_factorization.py  
│ └── recommender.py

# How it Works

🔹 User-Based Collaborative Filtering:  
 Recommends movies liked by users who are similar to the current user.  
🔹 Item-Based Collaborative Filtering:  
 Recommends movies similar to those the user already liked.  
🔹 Matrix Factorization (SVD):  
 Learns hidden preferences and recommends based on latent factors.

# Run the Full Pipeline

1. Install dependencies:  
 pip install -r requirements.txt  
  
2. Run the main recommendation pipeline:  
 python main.py  
  
Outputs like recommendation CSVs and enriched files are saved in the 'outputs' folder.

# Launch the Streamlit Web App

To use the interactive interface:  
  
 streamlit run streamlit\_app.py  
  
Features include:  
- User ID selection  
- Algorithm selection (User CF, Item CF, MF)  
- Top-N recommended movies with title + genres  
- Explanation of each recommendation type for first-time users

# Download and Place Dataset

Download the MovieLens 100k dataset from:  
 https://grouplens.org/datasets/movielens/100k/  
  
Place the following files in 'data/raw/':  
- u.data  
- u.item

# Authors

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