Movie Recommendation System using Collaborative Filtering

# 1. Introduction

This project demonstrates a simple movie recommendation system using user-user collaborative filtering. We use the MovieLens 100k dataset and implement the recommender system using Python and the Surprise library.

# 2. Objective

To build a movie recommender system that can predict ratings and suggest movies to users based on their historical preferences.

# 3. Dataset

The dataset used is the MovieLens 100k dataset. It contains 100,000 ratings (1-5) from 943 users on 1682 movies. Each user has rated at least 20 movies.

# 4. Tools & Technologies

- Python  
- Pandas  
- Surprise  
- Jupyter Notebook  
- Matplotlib

# 5. Methodology

1. Load and explore the dataset.  
2. Preprocess the data using Surprise.  
3. Train a KNN-based collaborative filtering model.  
4. Predict ratings on the test set.  
5. Evaluate the model using RMSE.  
6. Generate top-N recommendations for each user.

# 6. Code Overview

The code is implemented using the Surprise library. We use cosine similarity and a KNNBasic algorithm to perform collaborative filtering.

# 7. Results

The model successfully predicts ratings and provides top-N movie recommendations for users. Root Mean Squared Error (RMSE) is used to evaluate performance, with an RMSE around 1.0-1.1 indicating reasonable predictions.

# 8. Conclusion

The collaborative filtering-based recommender system demonstrates how user behavior can be used to provide personalized recommendations. This project can be extended by incorporating content-based features or deep learning.

# 9. Future Work

Future improvements include:  
- Hybrid recommendation systems  
- Streamlit/Flask-based web interface  
- Integration with real-time user interaction