

# Collaborative Filtering Based Movie Recommender System

Self-Learning Project  
(April 2024)

## Introduction

In April 2024, I undertook a self-learning project to develop a Movie Recommender system utilizing the Collaborative Filtering algorithm. The project involved applying advanced data processing techniques and machine learning methodologies to a real-world dataset. The primary goal was to predict user preferences for movies they had not yet rated, based on the historical ratings of a group of similar users.

## Dataset

The dataset used for this project comprised ratings data for 9000 movies from 600 unique users. The dataset presented challenges related to sparsity, as each user had only rated a small subset of the available movies. Addressing this sparsity was key to building an effective recommender system.

## Methodology

The core of the system was built using Collaborative Filtering, a popular recommendation technique that predicts a user's interest by considering the interests of similar users. The implementation involved the following key steps:

- **Data Preprocessing:** The dataset was preprocessed to handle missing values, normalize the ratings, and create user-item interaction matrices.
- **Collaborative Filtering Algorithm:** I implemented the Collaborative Filtering algorithm using Python libraries such as `NumPy` and `TensorFlow`. The algorithm used the user-item interaction matrix to identify patterns in user preferences.
- **Model Training:** The recommender model was trained to minimize the error between the predicted and actual ratings, using techniques such as gradient descent for optimization.
- **Evaluation:** The model's performance was evaluated using metrics like Root Mean Square Error (RMSE) on a test set of unseen data.

## Results

The recommender system successfully predicted movie ratings with a high degree of accuracy, demonstrating the effectiveness of the Collaborative Filtering approach in handling the sparsity and scale of the dataset. The final model showed promising results with a low RMSE, indicating good predictive performance.

## Conclusion

This project provided valuable hands-on experience in applying machine learning algorithms to real-world data. Through the development of this Movie Recommender system, I gained a deeper understanding of Collaborative Filtering and its application in recommendation engines. The project also enhanced my skills in Python, particularly in the use of libraries like `NumPy` and `TensorFlow` for data processing and model building.