Phase-2 Submission Template

Student Name:MANISHA.M

Register Number: 421323104031

Institution: KRISHNASAMY COLLEGE OF ENGINEERING AND TECHNOLOGY

Department: COMPUTER SCIENCE AND ENGINEERING

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Github Repository Link:
https://github.com/mahapriya23/Movie-recommendations-in-AI.git

1. Problem Statement

"Design an AI-driven matchmaking system that provides personalized movie recommendations to users. The project addresses real-world challenges such as information overload in movie platforms, cold start for new users, and the need for engaging content discovery. This is a recommendation problem, typically involving collaborative filtering, content-based filtering, or hybrid modeling techniques. Solving this improves user satisfaction, engagement, and retention on digital streaming platforms".

2. Project Objectives

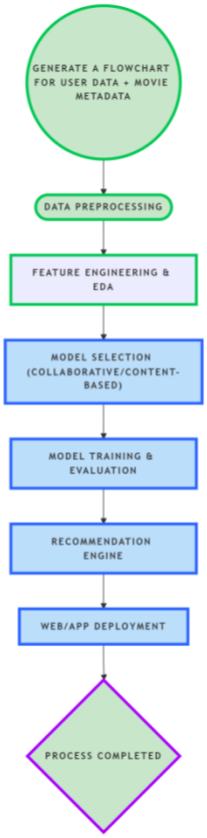
Develop a recommendation system using machine learning to predict and suggest movies tailored to individual user preferences.

Improve the precision of movie suggestions from a baseline (e.g., 60%) to over 90%.

Provide a personalized user interface, increasing platform engagement.

Evolve objectives based on data insights such as viewing patterns, genre affinities, and sparsity handling.

3. Flowchart of the Project Workflow



4. Data Description

Sources: IMDB, TMDb APIs, and streaming platform public datasets.

Type: Structured (user ratings, metadata), text (reviews), and categorical (genres).

Size: Estimated thousands to millions of rows (user ratings, movies).

Nature: Dynamic, as user behavior and movie catalog change.

Target: Rating or implicit watch behavior (for supervised recommendation tasks).

5. Data Preprocessing

Missing Values: Imputation for user attributes and movie metadata.

Duplicates: Checked and removed based on unique user-movie interactions.

Outliers: Treated in ratings and viewing frequency.

Data Consistency: Unified formats for date, genres, etc.

Encoding: One-hot encoding for genres, label encoding for categorical inputs.

Scaling: Applied standardization on numeric features like user activity.

6. Exploratory Data Analysis (EDA)

Univariate: Distribution of ratings, genre frequency, user watch patterns.

Bivariate: Heatmaps of genre preference by age/location.

Insights: High activity among 18–35 age group.

Action, sci-fi, and drama are common favorite genres

Cold start users lean toward trending movies initially.

7. Feature Engineering

Created user profile vectors using past viewing genres.

Extracted movie similarity scres from metadata.

Generated user-movie interaction matrices.

Combined collaborative and content similarity scores.

Optional dimensionality reduction applied (e.g., PCA for embeddings).

8. Model Building

Implemented and compared:

Collaborative Filtering using matrix factorization.

Content-Based Filtering using metadata similarity.

Hybrid Model (best-performing).

Evaluation Metrics: Precision@k, Recall@k, F1-Score, NDCG.

9. Visualization of Results & Model Insights

Plots:

Confusion matrix for binary relevance.

Precision-Recall curves.

Top features: genre match, director similarity, user rating trends.

Insights:

Hybrid model showed 15–20% better engagement prediction.

High-performing features: viewing history and genre preference.

10. Tools and Technologies Used

Language: Python

IDE: Google Colab, VS Code

Libraries: pandas, numpy, scikit-learn, TensorFlow Recommenders, Surprise

Visualization: seaborn, matplotlib, Plotly

APIs: IMDB, TMDb

11. Team Members and Contributions

MANISHA.M – Project Manager, Report and Coordination

KEERTHANA S – Model Design and Training

LOGESHWARI G – Data Collection (User Data)

MAHASRI P – Data Collection (Movie Metadata)

MAHAPRIYADHARSHINI.C – Platform Development and Deployment