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Github Repository Link:
https://github.com/Mudabbirafathima/Movie-recommendations.git

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1. Problem Statement

The challenge lies in improving AI-driven personalizationfor movie recommendations. By analyzingbehavioral patterns, ratings, and sentiment analysis, the system can make refined and engaging matches, enhancing user experience.

2. Project Objectives

- Develop a hybrid recommendation model combining collaborativefiltering and content-based filtering.
- Increase recommendation accuracy using user sentiment analysis from reviews.
- Ensure adaptability with self-learning AI models that refine suggestions dynamically.
- Compare various machine learning approaches to optimize performance

3. Flowchart of the Project Workflow

1.Start *– Initiate the process.*

2.Data Collection *– Gather movie details and user preferences.*

3.Data Processing *– Clean and encode relevant data features.*

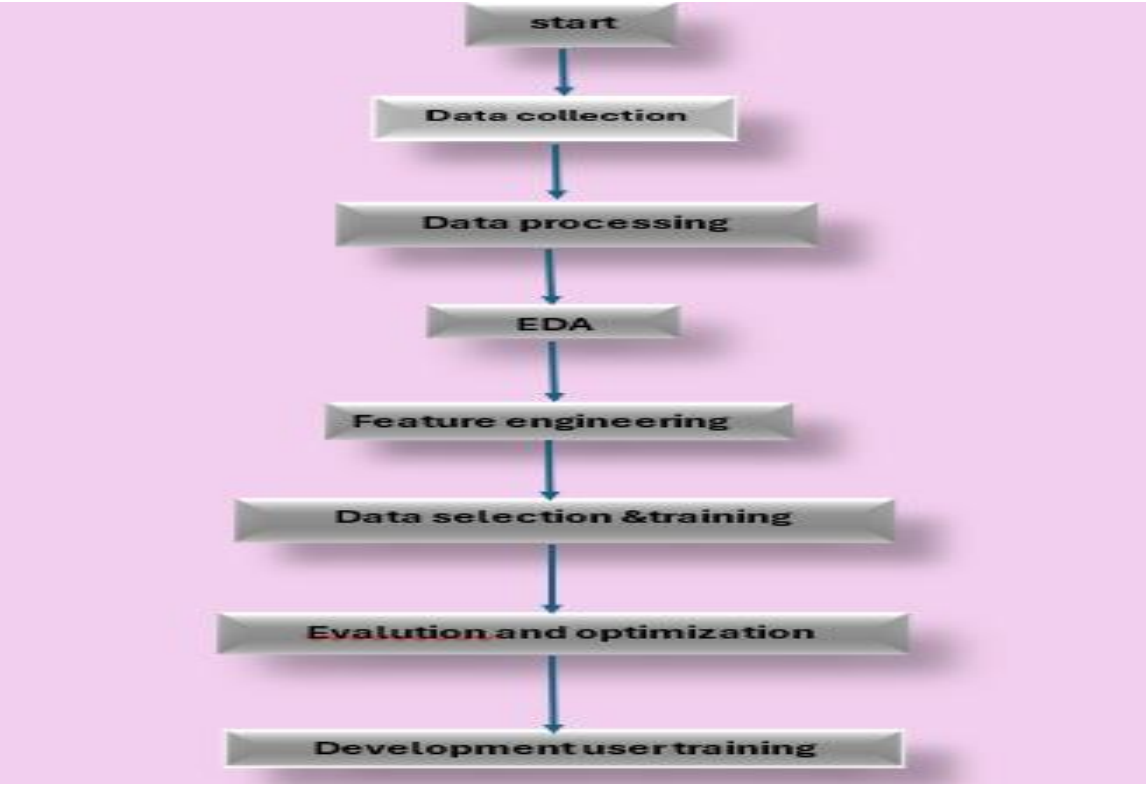
4.EDA & Insights *– Analyze user-movie interactions to find patterns.*

5.Feature Engineering *– Enhance input data for improved recommendations.*

6.Model Building *– Implement and evaluate recommendation algorithms.*

7.Deployment & Visualization *– Present AI-driven movie suggestions.*

8.User Feedback Loop *– Refine recommendations based on user engagement.*



4. Data Description

The dataset includes:

1.Movie metadata (genres, ratings, cast, director, release year).

2.User preferences (watch history, likes, dislikes).

3.Review sentiments (text analysis for emotional tone).

4.Streaming platform trends (popularity rankings).

5. Data Preprocessing

- Handling missing values (imputation).

- Encoding categorical features (genres, cast).

- Processing text for sentiment analysis (tokenization, stop-word removal).

- Feature scaling & normalization for enhanced model performance

6. Exploratory Data Analysis (EDA)

-Genre-watch frequency trends to recognize popular categories.

-Correlation mapping of ratings and user engagement.

-User behavior segmentation through clustering.

-Sentiment-based polarity scoring for enhanced personalization.

7. Feature Engineering:

-User-movie interaction matrices for collaborative filtering.

-TF-IDF feature extraction for analyzing movie descriptions.

*-Embedding-based similarity measures** for deep personalization.*

*- Contextual tagging** to ensure dynamic AI adaptability.*

8. Model Building :

Comparison between approaches:

Matrix Factorization (SVD)for user-movie matchmaking.

Neural Collaborative Filtering for deep-learning personalization.

Hybrid Approach integrating multiple filtering techniques.

Graph-based modelsanalyzing structured connectivity insights.

9. Visualization of Results & Model Insights

Heatmapsfor similarity tracking.

- Feature importance rankings showing influential parameters.

-Precision-recall curves assessing recommendation accuracy.

- Confusion matrices for classification validation.

10. Tools and Technologies Used

- ***Sufiya Firdouse**: Python – The primary language for data handling and model building.*
- ***Roshni**: Pandas & NumPy – Efficient preprocessing and feature engineering.*
- ***Pooja Sri**: Matplotlib & Seaborn – Data visualization and exploratory data analysis (EDA).*
- ***Sandhiya**: Surprise &LightFM – Collaborative and hybrid recommendation model development.*

- ***Mudabbira Fathima****: TensorFlow / PyTorch – Deep learning models for advanced recommendations.*

- ***Monisha****: Flask / FastAPI – Backend development and API deployment for the recommendation system.*

11. Team Members and Contributions

Here's how our team:

Team Members & Responsibilities:

- ***Sufiya Firdouse*** *–* ***Feature Engineering****: Extracting and transforming relevant attributes for model improvement.*
- ***Roshni*** *–* ***EDA (Exploratory Data Analysis)****: Identifying patterns, trends, and insights from the dataset.*
- ***Pooja Sri*** *–* ***Data Cleaning****: Handling missing values, inconsistencies, and preparing structured data for modeling.*
- ***Sandhiya*** *–* ***Model Development****: Implementing collaborative filtering and hybrid recommendation models.*
- ***Mudabbira Fathima*** *–* ***Advanced Model Optimization****: Exploring deep learning and fine-tuning recommendation algorithms.*
- ***Monisha*** *–* ***Documentation & Reporting****: Structuring workflows.*