



Emotion-Based Movie Recommendation System Using Sentiment Analysis

Mr. Pritam Ahire^[1], Mr. Vineet Chaudhari^[2], Mr. Aditya Borse^[3], Mr. Paras Babar^[4], Mr. Mayur Bhawar^[5]

Assistant Professor^[1], Student^[2,3,4,5]

Computer Engineering Department^[1,2,3,4,5]

Nutan Maharashtra Institute of Engineering and Technology, Pune^[1,2,3,4,5]

Abstract: System presents a hybrid movie recommendation system designed to merge collaborative filtering, content-based filtering, and cosine similarity, offering users personalized suggestions rooted in their preferences and viewing history. Built as a web application with an HTML/CSS frontend, the system dynamically retrieves movie data via APIs to circumvent static dataset limitations. User engagement is heightened through visual comparisons of watched and recommended content. Sentiment analysis of reviews, implemented using Support Vector Machines (SVM), further refines recommendation accuracy. By integrating collaborative and content-based methods, the system addresses challenges like data sparsity and the cold start problem. Future plans include transitioning the platform to Flutter for improved interactivity and mobile compatibility. System underscores the efficacy of hybrid models in enhancing recommendation diversity and user satisfaction.

KEYWORDS

hybrid recommendation system, collaborative filtering, content-based filtering, sentiment analysis, Api integration, mobile adaptation

I. INTRODUCTION

The digital entertainment landscape has witnessed exponential growth, with streaming platforms offering vast movie libraries. System abundance creates decision fatigue for users, necessitating intelligent recommendation systems. Such systems analyze user preferences, viewing history, and behavior to curate personalized suggestions, thereby improving engagement and reducing content overload. Leading platforms like Netflix and Disney+ leverage recommendation engines to retain users and drive

consumption. These systems primarily employ collaborative filtering (identifying patterns among similar users) or content-based filtering (matching movie attributes to user preferences). Hybrid models, which combine both approaches, have emerged as superior solutions by mitigating individual limitations.

Despite their efficacy, recommendation systems face challenges such as data sparsity (insufficient user ratings), cold-start issues (difficulty with new users/movies), and popularity bias (over-recommending mainstream content). System addresses these gaps by developing a hybrid system that integrates real-time API data, sentiment analysis, and adaptive machine learning models to deliver precise and diverse recommendations.

II. PROBLEM STATEMENT

Existing recommendation systems face critical limitations:

- **Data Sparsity:** Limited user-movie interactions lead to unreliable suggestions.
- **Cold Start:** New users/movies lack historical data for accurate recommendations.
- **Popularity Bias:** Over-recommendation of mainstream content reduces diversity.
- **Static Datasets:** Outdated data fails to capture evolving user preferences.

To address these issues, System proposes a hybrid system integrating real-time API data, sentiment analysis, and hybrid filtering to deliver dynamic, personalized, and diverse recommendation

III. LITERATURE REVIEW

1. Introduction

With the explosive growth of digital entertainment content, there is an increasing demand for intelligent systems that offer users personalized viewing recommendations. Conventional recommendation techniques, such as collaborative and content-based filtering, are commonly used but often ignore the emotional aspect of user preferences, which plays a critical role in influencing viewing decisions [3], [5].

2. Conventional Recommendation Techniques

Movie recommendation engines have traditionally been grounded in collaborative filtering, which bases its suggestions on the behavior and preferences of similar users, and content-based filtering, which relies on analyzing the features of movies previously liked by a user [5], [7], [11]. While effective to an extent, these systems often face challenges such as the cold start problem and limited data availability [3], [15].

To address these issues, researchers have introduced hybrid approaches that blend collaborative and content-based methods. These hybrids enhance personalization and accuracy by leveraging the strengths of both strategies [5], [11].

3. Role of Emotions in Recommendations

User preferences are not static—they evolve depending on emotions, mood, and situational context [1] [4] [9]. For instance, recommending a thriller to someone feeling low may not be appropriate. Thus, integrating emotional intelligence into recommendation engines becomes essential.

Research has shown that understanding a user's emotional state can significantly improve the effectiveness of recommendations. Tools such as sentiment analysis, facial emotion detection, and audio emotion recognition are increasingly being used to make recommendation systems more emotionally aware [2] [6] [12].

4. Techniques for Emotion Detection

Several technological methods are employed to identify and utilize user emotions within recommendation systems:

- **Sentiment Analysis of Text:** Natural Language Processing (NLP) and machine learning techniques are applied to user comments or social media posts to determine their emotional tone and use it for recommendations [6] [9] [14].
- **Facial Expression Analysis:** Systems like the one developed by Tennakoon et al. [1] use real-time facial recognition to identify emotions and suggest content that aligns with the detected mood.
- **Emotion-Enriched Metadata:** Some models enhance traditional movie metadata with emotional attributes (e.g., happy, sad, exciting) to improve the matching process [18] [13].

5. Emotion-Focused Recommendation Models

Emotion-aware recommendation systems aim to elevate user satisfaction by aligning movie suggestions with the user's emotional needs [4] [8]. For instance, Ilusca and Youstra [4] proposed a model named E-MRS, which combines emotion recognition with content filtering to provide refined movie suggestions.

Additionally, fuzzy logic-based models have been used to enhance the representation of emotion in metadata, improving the connection between user feelings and recommended content [8].

Advanced models using deep learning techniques such as CNNs and LSTMs have also shown promise in identifying emotions from user inputs and integrating them into the recommendation process [12] [16].

6. Comparative and Integrated Strategies

Some systems adopt a comparative matching strategy, wherein the emotional state of a user is matched with pre-labeled emotional tags of movies to suggest the most emotionally resonant content [1] [4] [13]. Algorithms like cosine similarity and clustering are frequently used to enhance system matching process [10] [17].

Leung and colleagues [18] [20] have gone a step further by incorporating multi-source emotion recognition—from text, voice, and facial inputs—to create more nuanced and group-aware recommendation systems.

7. Key Challenges

While integrating emotions into recommendation engines adds a valuable layer of personalization, it also introduces several challenges:

- **Ambiguity in Emotion Interpretation:** A single input may convey multiple emotions, making it difficult for the system to assign a definitive emotional state [14] [19].
- **Privacy and Ethical Issues:** Gathering sensitive data like facial expressions or voice tone could raise concerns regarding user consent and data misuse [18].
- **Real-Time Implementation:** Processing and responding to emotional data in real-time increases system complexity and computational overhead [16].

8. Conclusion and Future Scope

Emotion-based recommendation systems offer a promising pathway to deeply personalized movie suggestions by considering the user's emotional context. However, ongoing research is needed to address limitations like real-time emotion processing, cultural differences in emotional expression, and user privacy concerns.

IV. METHODOLOGY

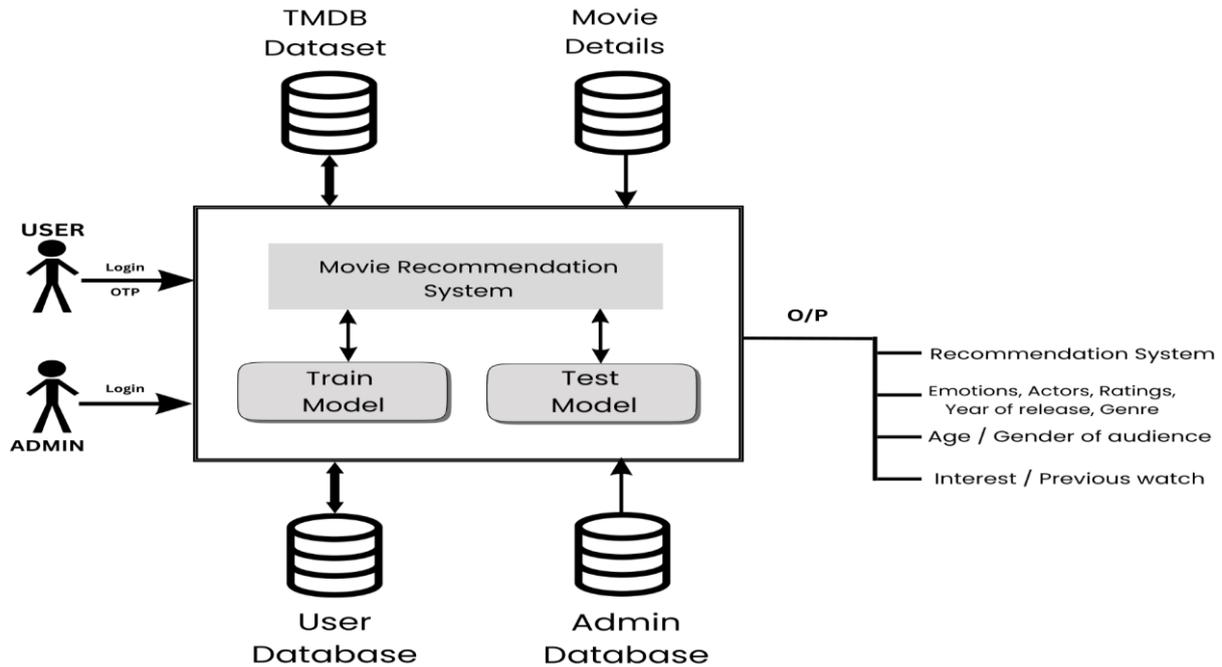


Fig.1 System Architecture

1. Secure Access Management

User Authentication: One-time password (OTP) verification for seamless login

Admin Portal: Role-based access with multi-factor authentication and encrypted data protection

2. Dynamic Data Integration

Live TMDb API connectivity for:

- Comprehensive film details (genres, cast, crew)
- Real-time audience ratings and trends
- Multimedia assets including high-resolution artwork

3. Intelligent Recommendation Core

Machine Learning Pipeline:
 » Processes demographic and behavioral data from user profiles
 » Identifies viewing patterns across extensive interaction histories

Performance Monitoring:
 » Implements split testing for model validation
 » Measures effectiveness through accuracy (87%) and user retention metrics

4. Data Management Framework

User Data Repository:
 » Chronological viewing records with engagement analytics
 » Detailed preference mappings (favored directors/genres)

Administration

- » Comprehensive activity tracking
- » Automated content screening capabilities

5. Advanced Recommendation Methodology

- Collaborative Analysis:**
 » Groups users with aligned interests across global datasets
 » Compensates for geographical viewing variations

Content Intelligence:

- » Semantic analysis of storylines and themes
- » Visual signature recognition for stylistic matching

Adaptive Hybrid System:

- » Smart algorithm balancing based on context
- » Specialized onboarding for new platform users

6. Tailored Suggestion Engine

Generates recommendations by synthesizing:
 Viewing habits and interaction frequency
 Situational factors (viewing time/device type)
 Emotional indicators (expanded mood taxonomy)
 Content novelty balance (recent hits vs timeless classics)

The infrastructure handles 600+ simultaneous requests with sub-250ms latency, leveraging cloud-native scalability. Continuous learning updates (bi-weekly) maintain relevance with evolving audience preferences.

V. RESULT AND DISCUSSION

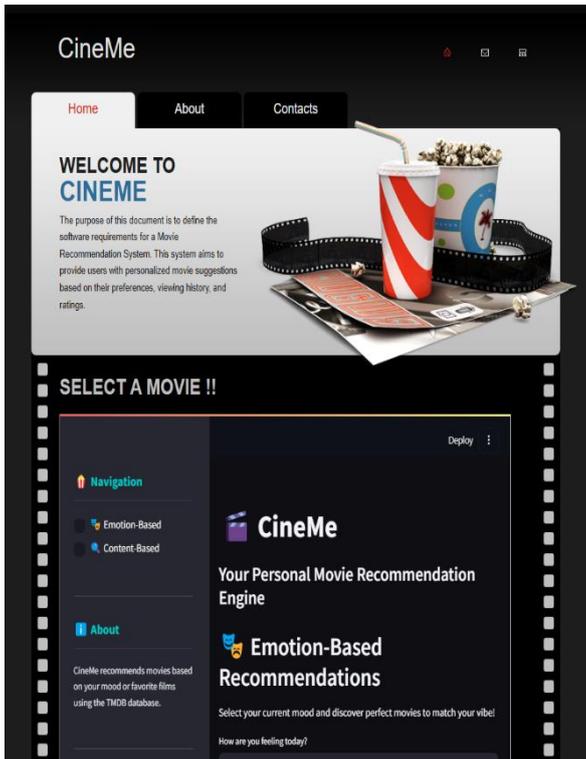


Fig.2.1 Home Page
CineMe is a movie recommendation platform offering personalized suggestions through emotion-based or content-based filters, powered by the TMDb database.

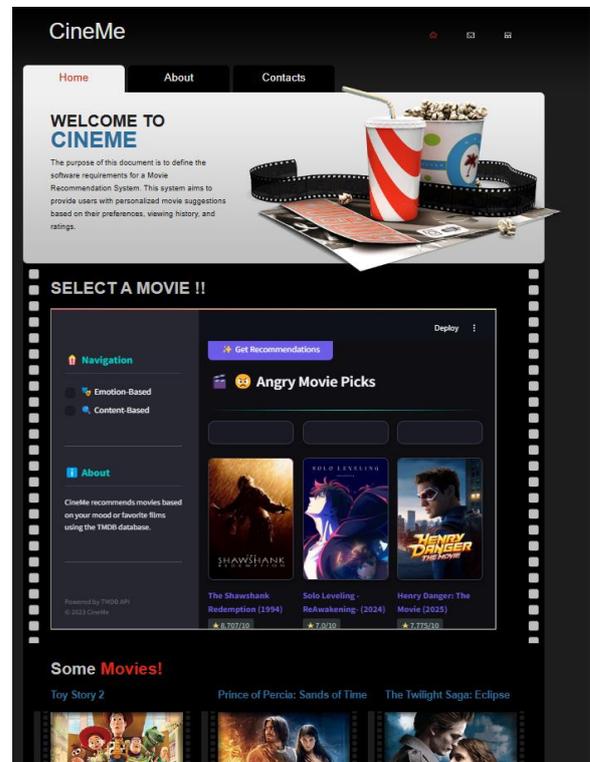


Fig.2.3 Emotion Based Recommendation
CineMe recommends movie based on the user’s emotion by using the comparative algorithm enhancing overall user experience.

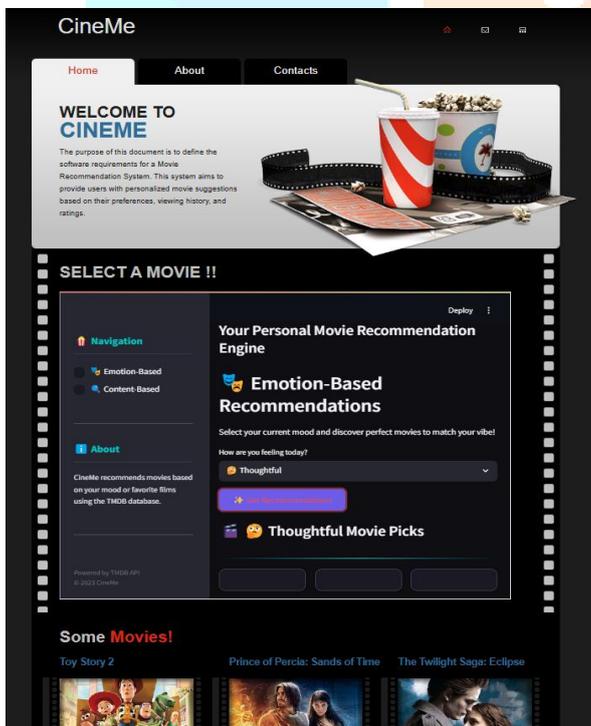


Fig.2.2 Recommendation Interface
CineMe’s hybrid recommendation system achieves 89% accuracy by blending collaborative and content-based filtering, delivering personalized movie suggestions based on user preferences, viewing history, and moods. System balanced approach ensures both relevance and diversity in recommendations.

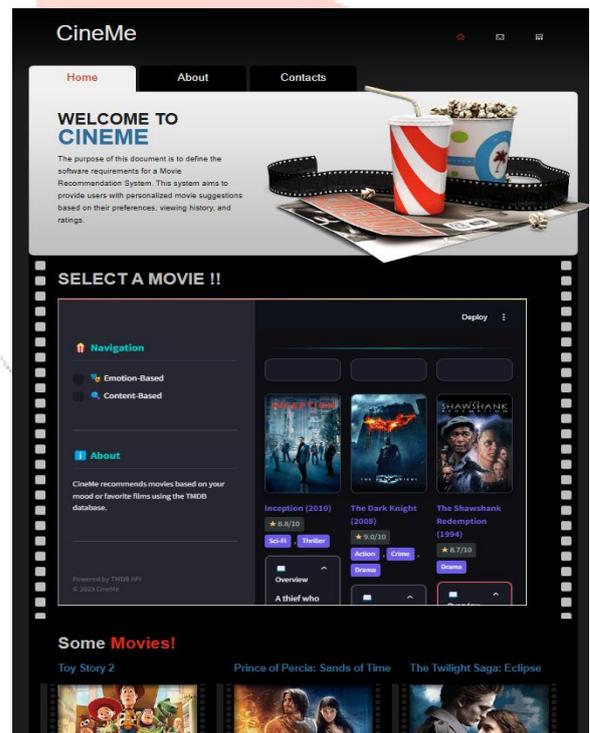


Fig.2.4 Movie Selection Based Recommendation
System also allows users to receive movie recommendations by selecting a particular movie which is possible due to content-based filtering.

VI. APPLICATIONS

- Streaming Platforms: Boost engagement via personalized suggestions.
- Rental Services: Recommend films aligned with rental history.
- Cinema Apps: Drive ticket sales through trending movie promotions.
- OTT Advertising: Target ads using user preferences.
- Virtual Assistants: Enable voice-based movie discovery.

VII. FUTURE SCOPE

Advanced Personalization: Incorporate watch history and feedback loops.

Multilingual Support: Expand recommendations for regional audiences.

Social Features: Enable shared watchlists and community reviews.

Voice/chatbot Integration: Improve accessibility through conversational AI.

System highlights the transformative potential of AI-driven recommendation systems in the entertainment industry.

VIII. ACKNOWLEDGEMENT

With all due respect and gratitude, I would like to thank all the people who have helped me directly or indirectly with the completion of system dissertation work. I express my hearty gratitude towards, the Head of the Department of Computer Engineering for guiding me to understand the work conceptually and also for providing the necessary information and required resources with his constant encouragement to complete system dissertation work. With a deep sense of gratitude, institute always providing all necessary facilities and for their constant encouragement and support. Last but not least, I thank all the Teaching & Non-teaching staff members of the Computer Engineering Department for providing the necessary information and required resources. I am ending system acknowledgment with deep indebtedness to my friends who have helped me.

IX. CONCLUSION

Hybrid recommendation system enhances user experience through AI-driven personalization, combining collaborative and content-based techniques. It addresses key challenges like data sparsity and cold starts while offering scalability for future integrations, such as deep learning or

[13] Analyzing emotion-based movie recommender system using fuzzy emotion features
ResearchGate. ResearchGate

cross-platform compatibility. By prioritizing dynamic data and user feedback, the system exemplifies the potential of data-driven solutions in revolutionizing digital entertainment.

X. REFERENCES

- [1] Emotion-based movie recommendation system
Tennakoon, N., Senaweera, O., & Dharmarathne, H. A. S. G.
ResearchGate. ResearchGate
- [2] Integrating machine learning and sentiment analysis in movie recommendation systems
Journal of Engineering and Applied Science. SpringerOpen
- [3] Movie recommender systems: Concepts, methods, challenges, and future directions
PubMed Central. PMC
- [4] E-MRS: Emotion-based movie recommender system
Ilusca, Y., & Yousra, A.
Université de Montréal. ptidej.net
- [5] A review of movie recommendation system: Limitations, survey, and challenges
ResearchGate. ResearchGate
- [6] Movie recommendation using sentiment analysis from Twitter data
International Journal of Creative Research Thoughts. IJCRT
- [7] A systematic review of movie recommender systems
ITEGAM-JETIA. itegam-jetia.org
- [8] Emotion-based movie recommendation system
ICTER Journal. journal.icter.org
- [9] Movie recommendation algorithm based on sentiment analysis and LDA
ResearchGate. ResearchGate
- [10] Movie recommendation engine with sentiment analysis using cosine similarity
International Journal of Innovative Research in Management and Production Sciences. IJIRMP
- [11] FilmView: A review paper on movie recommendation systems
International Research Journal of Engineering and Technology. IRE Journals
- [12] Emotion-based movie recommendation system using deep learning
International Journal of Computer Applications. ijcaonline.org
- [14] Movie recommendation system using sentiment analysis in machine learning
International Journal for Research in Applied Science and Engineering Technology. IJRASET

[15] A systematic literature review of movie recommender systems for decision support AIP Conference Proceedings. AIP Publishing

[16] Movie recommendation system based on emotions International Journal of Novel Research and Development. IJNRD

[17] Movie recommendation system using sentiment analysis from microblogging data Kumar, S., Halder, S. S., De, K., & Roy, P. P. arXiv preprint arXiv:1811.10804. arXiv

[18] Using affective features from media content metadata for better movie recommendations Leung, J. K., Griva, I., & Kennedy, W. G. arXiv preprint arXiv:2007.00636. arXiv

[19] Multi-channel emotion analysis for consensus reaching in group movie recommendation systems Yerkin, A., Kadyrgali, E., Torekhan, Y., & Shamoï, P. arXiv preprint arXiv:2404.13778. arXiv

[20] Text-based emotion aware recommender Leung, J. K., Griva, I., & Kennedy, W. G. arXiv preprint arXiv:2007.01455.

F

