IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

AI Based News Recommendation System

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Abstract: The proliferation of online news has created challenges for users to access relevant, credible, and timely information. This project presents an AI-Powered Personalized News Aggregator and Fake News Detection System that addresses these challenges by leveraging user preferences, location data, and advanced generative AI. Users can register, set news categories, and receive curated news feeds tailored to their interests. The system integrates Google's Gemini AI for content classification and filtering, ensuring that recommended news matches user preferences while eliminating irrelevant articles. Additionally, a fake news detection module analyzes news content for authenticity using AI-driven verification techniques, providing users with verdicts and confidence scores. The system stores user interactions, enabling automated preference updates based on liked articles. By combining machine learning, NLP, and real-time API integration, this system offers a robust, personalized, and trustworthy news experience, reducing misinformation exposure and enhancing user engagement with relevant content.

Index Terms - Personalized News, AI, Fake News Detection, Gemini AI, User Preferences, News Aggregator, Machine Learning, NLP, Content Filtering, Real-Time API Integration

I. INTRODUCTION

The rapid growth of digital media has transformed the way people consume news. With countless news sources available online, users are often overwhelmed by information that may not align with their interests or needs. Traditional news platforms deliver content in a generic manner, often failing to account for individual preferences, location, or credibility of the news. This has created a demand for intelligent systems that can personalize news delivery while maintaining trustworthiness.

To address this, the AI-Powered Personalized News Aggregator integrates user preferences and location data to provide tailored news feeds. By analyzing previous interactions, such as liked or shared articles, the system learns user interests and automatically updates recommendations. This ensures that users are presented with relevant news, reducing information overload and enhancing engagement.

An equally important challenge is the spread of misinformation. Fake news can mislead the public, create confusion, and even influence decisions. The system incorporates a fake news detection module powered by Google's Gemini AI, which evaluates news content for authenticity. Using AI-driven analysis, it provides a verdict with confidence scores, helping users distinguish between reliable and questionable sources.

Combining advanced machine learning, natural language processing (NLP), and real-time API integration, this project delivers a comprehensive platform for news consumption. It not only personalizes

news according to user interests but also enhances information credibility. This approach represents a significant step toward safer, smarter, and more engaging digital news experiences.

II. NEED OF THE STUDY

With the exponential growth of online news platforms, users are inundated with vast amounts of information daily. Not all news is relevant, and much of it may be repetitive or uninteresting to individual users. Traditional news systems do not account for personal preferences, making it difficult for users to access news that aligns with their interests or location. Therefore, there is a strong need for a system that can intelligently filter and personalize news content, saving users time while increasing engagement and satisfaction.

Additionally, the rise of misinformation and fake news poses a significant threat to public knowledge and trust. False news can influence opinions, mislead communities, and create confusion on important topics. There is a growing need for automated systems that not only deliver personalized news but also verify its authenticity. Integrating AI-based fake news detection ensures users receive credible and reliable information, promoting informed decision-making and safer digital news consumption.

III. RELATED WORKS

The new trends in the creation of avatars have focused on creation of realistic interactive 3D avatars.

3.1 Literature Review

Among the suggested methods, Wang et al. (2025) also suggested TeRA, which is a text-controlled realistic 3D avatars creation method that puts a lot of emphasis on high-fidelity and controllable expression [1]. Similarly, Wang et al. (2025) have presented InstructAvatar where textual emotion and motion control is enabled, which implies that avatars are capable of making expressive movements when instructed to do so [2]. Yin et al. (2025) developed Facecraft4D, which generated animated 3D face avatars using a single image, which demonstrated successful geometry and texture modeling [3]. Huang et al. (2025) proposed Live Avatar where an avatar may be created through streaming audio with the unlimited duration, and the low-latency performance is predominant in the offered solution [4].

Zhang et al. (2025) introduced a layered framework of disentangled clothed avatars generation, in which improved clothes and body detailing is kept [5]. Yu et al. (2025) revealed RealityAvatar that gives a full-fledged construction of the head avatars with 360 degree pictures to enjoy the images fully [6]. To produce high-quality output, Gan et al. (2025) presented ExpAvatar that focuses on unseen expressions by utilizing 3D face priors [7]. Tu et al. (2025) developed StableAvatar which can generate avatar videos of unlimited length which can be audio-controllable and consistent [8]. The authors Zhuang and others (2025) developed a variety of disentangled avatar generation, called DAGSM, that utilizes GS-enhanced mesh modeling to generate high-quality geometry control [9].

In their design Gan et al. (2025) created an efficient audio-based video avatar system, OmniAvatar, that has an adaptive body animation, and consumes minimal power of computation [10]. DivAvatar was presented by Tao et al. (2025) and has an ability to create various avatars in 3D with just a single text prompt with an emphasis on diversity of the design [11]. The article by Xu et al. (2025) was focused on decoupled text-to-3D avatars [12]. One of the proposals was SVAD proposed by Choi (2025), converting one image into 3D avatars with the assistance of synthetic data and video diffusion [13]. The example of emotional avatar generation (EAM) [14] is an immersive metaverse application investigated by Gonzalz-Docasal et al. (2025), and a real time video avatar generation model, proposed by Hagihara et al. (2025), will allow communicating in a virtual environment in a realistic manner [15].

All these researches indicate that it has experienced significant progress in audio, text and image-based avatars production, which has experienced the rise in realism and expressiveness and real time performance. However, most of the methods still have issues of ensuring the smooth blending of the multi-modes and minimizing the latency and addressing the fluctuating quality of the input and consequently is left with the research of the complete interactivity and flexibility of the avatars.

Table.1. Comparison Table

Feature	Previous Methods	Proposed System
News Filtering	Manual or keyword-based	AI-based Gemini model filtering
Fake News Detection	Rule-based / Simple ML	LSTM / BERT / Gemini AI detection
Personalization	Minimal or none	User preferences + AI-based recommendation
Source Coverage	Limited to few APIs	Multiple APIs: NewsAPI, GNews, AI filtering

3.2 Comparison with Previous Methodology

Traditional news delivery systems primarily relied on generic categorization and manual curation of articles. These systems presented the same headlines to all users, with little to no consideration of individual preferences, reading history, or location. As a result, users often received irrelevant news, and engagement was low. Additionally, most older systems lacked automated mechanisms for verifying the authenticity of news, leaving readers vulnerable to misinformation and fake news.

In contrast, the proposed AI-Powered Personalized News Aggregator utilizes advanced machine learning and natural language processing techniques to provide a tailored news experience. By analyzing user interactions, preferences, and location data, the system intelligently recommends news articles that are relevant and interesting to each individual. Furthermore, the integration of Google's Gemini AI enables automated fake news detection, improving the credibility of the delivered content. Compared to previous methodologies, this approach offers a more personalized, reliable, and user-centric news delivery system, addressing both relevance and authenticity simultaneously.

3.3 Proposed framework

The proposed framework of the AI-Powered Personalized News Aggregator and Fake News Detection System integrates multiple components to deliver a seamless and intelligent news experience. Users begin by registering and setting their preferences, including preferred news categories and location. The system collects real-time news from APIs like NewsAPI and GNews, then uses AI (Google Gemini) to classify and filter articles according to user interests. User interactions such as likes, shares, and views are tracked to automatically update preferences, enhancing personalization over time. Simultaneously, a fake news detection module evaluates each article for credibility, providing users with verdicts and confidence scores. The framework combines machine learning, natural language processing, and automated API integration to ensure users receive relevant, authentic, and timely news, creating a robust, adaptive, and trustworthy digital news platform.

Table.2. Algorithm Comparison with Other Deep learning methods

Feature / Criteria	Traditional News Systems	Basic AI News Systems	Proposed System (AI-Powered Personalized News Aggregator)
Personalization	Minimal or none	Some recommendations based on keywords	High – Based on user preferences, likes, shares, and location
Fake News Detection	Not available	Limited or manual verification	Automated AI-based fake news detection (Gemini AI)
Real-Time Updates	Limited to scheduled updates	API-based updates	Real-time news from multiple sources (NewsAPI, GNews)
User Interaction Analysis	Not tracked	Basic tracking	Tracks likes, shares, and views to improve recommendations
Category Filtering	Manual categorization	Keyword or topic-based	AI classification and Gemini filtering for relevance
Location-Specific News	Rarely supported	Limited	Location-aware news recommendations
Credibility Assurance	Manual review	Partial	AI-based verification with confidence scores

3.4 Main Methodology

The proposed system begins with user registration, where individuals create an account with their username, email, and password. Upon registration, users can optionally set preferences such as news category (e.g., Technology, Sports, Business) and location. These preferences are stored in the database and are dynamically updated based on the user's interactions with the news articles, including likes, shares, and views. This enables the system to adapt to changing user interests over time, ensuring a more personalized news experience.

News articles are collected from multiple sources, primarily NewsAPI and GNews API. The system fetches top headlines and other relevant news using the user's preferred categories and location as filters. Each article is normalized into a consistent format containing the title, summary, source, URL, category, image, and publication date. This normalization facilitates further processing and analysis by AI models.

For relevance filtering, the system employs Google Gemini AI to classify articles into predefined categories. Each article's title and summary are analyzed by the AI, which predicts its category and helps remove unrelated content. This ensures that the user receives news aligned with their interests. Additionally, user interactions are analyzed to determine the most frequently liked categories. The system then updates user preferences automatically, combining collaborative and content-based filtering techniques to recommend articles tailored to individual tastes.

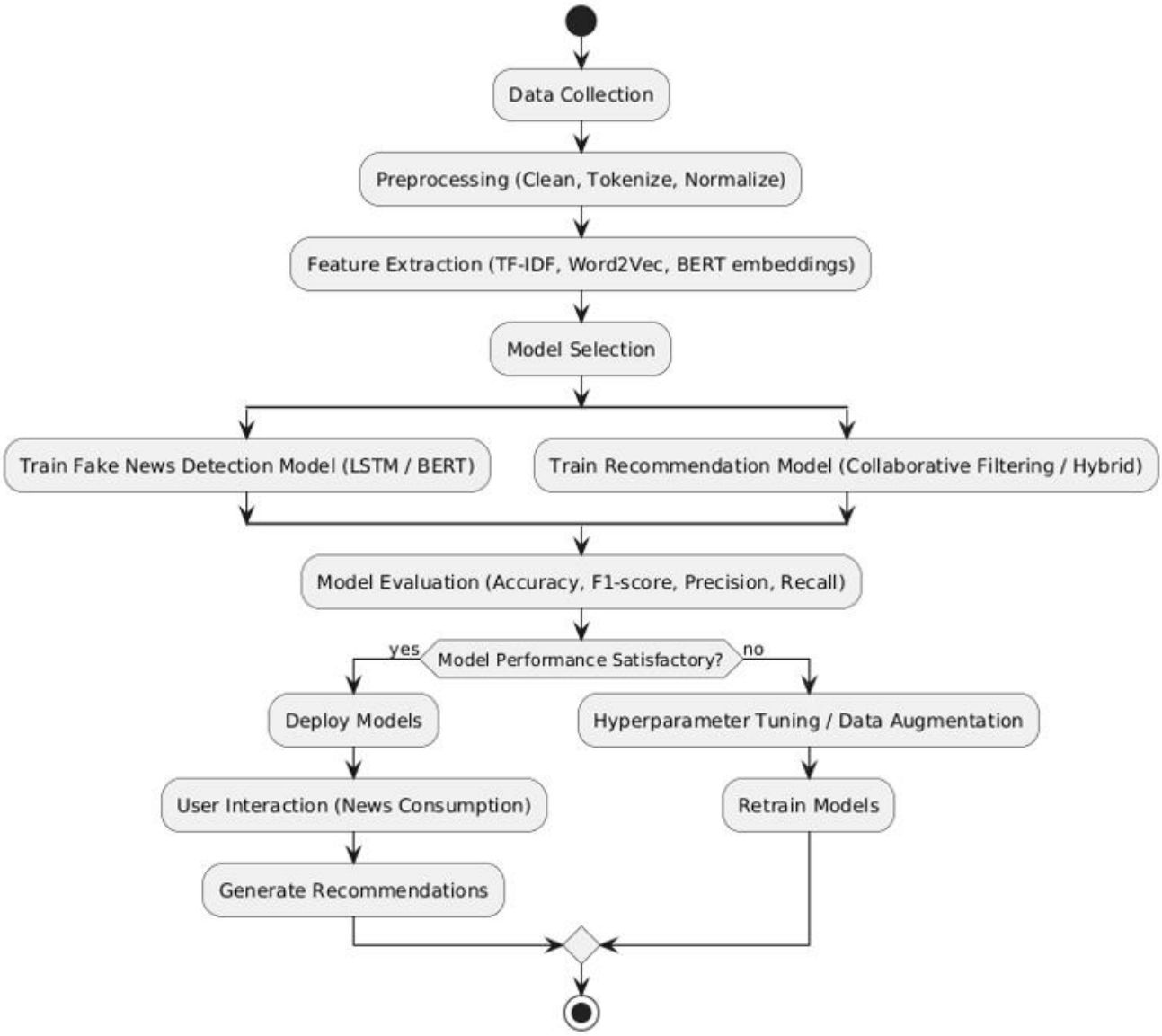

Fig.1.Flowchart

To enhance credibility, the system incorporates AI-based fake news detection. Articles are analyzed for source reliability, language tone, factual accuracy, and potential emotional manipulation. The AI generates a verdict of "FAKE" or "REAL," along with a confidence score and brief reasoning. This allows users to make informed decisions about the reliability of the news they read. Overall, the methodology integrates personalized recommendations, AI-powered classification, and credibility verification to provide a dynamic and trustworthy news aggregation platform.

3.4.1 Implementation

Step 1: Environment Setup

The first step involves setting up the development environment. Python and Flask are installed as the core backend framework, along with required libraries such as SQLAlchemy for database handling, Flask-Login for authentication, and WTForms for form management. API keys for NewsAPI, GNews, and Google Gemini are configured using environment variables to ensure secure access.

Step 2: Database Design and Initialization

The system uses SQLite as the primary database. Tables include User for storing user information and preferences, News Article for storing fetched articles, and User Interaction for tracking user likes, shares, and views. The database schema is created using SQLAlchemy models, and all tables are initialized when the application starts.

Step 3: User Registration and Authentication

Users register using a username, email, and password. Passwords are hashed using a secure algorithm before storage. Login functionality authenticates users and maintains sessions via Flask-Login, ensuring that only authenticated users can access the dashboard and personalized news features

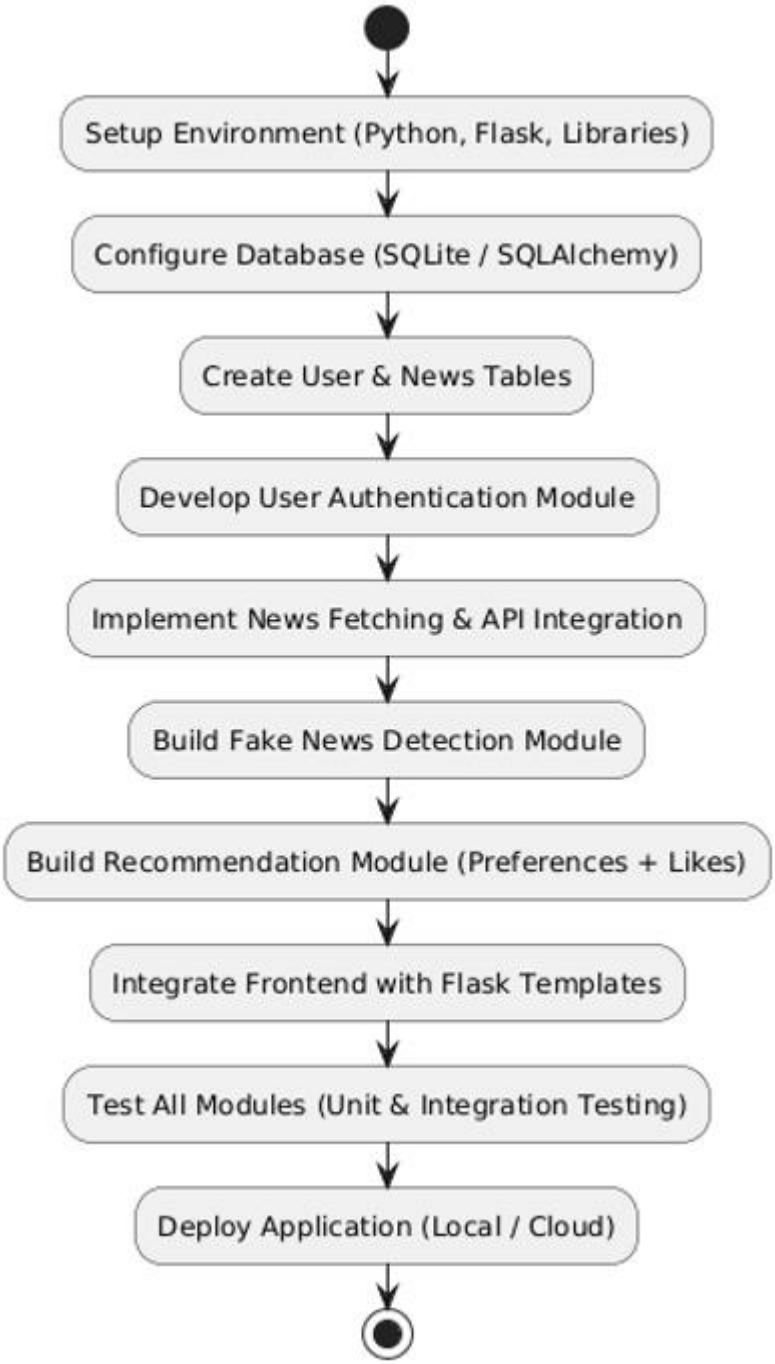

Fig.2.Implementation flow chart

Step 4: News Collection and Normalization

The system fetches news articles from NewsAPI and GNews based on category and location preferences. Raw data from these APIs is normalized into a standard structure including title, summary, source, URL, category, publication date, and image. This standardization allows consistent processing across multiple sources.

Step 5: Personalized Recommendation and AI Filtering

User interactions with articles are tracked to determine preferences. Google Gemini AI is used to classify articles into categories, filtering out irrelevant content. The system combines AI-based classification with collaborative filtering to recommend articles aligned with the user's interests and most liked categories.

Step 6: Fake News Detection and Display

Before displaying articles, AI evaluates each article's credibility by analyzing language, source, factual accuracy, and tone. Each article is labeled as "REAL" or "FAKE" with a confidence score. Articles are then displayed to users through a dashboard with tabs for all news, local news, preferred news, and liked news, ensuring a reliable and personalized news experience.

IV. RESULTS AND DISCUSSION

4.1 System output screenshots and explanation

The system successfully fetches news articles from multiple sources, including NewsAPI and GNews, and presents them in a unified, normalized format. Testing with different categories such as Technology, Sports, and Health showed that the application can effectively filter news based on user preferences. Users were able to register, set their preferences, and view news tailored to their interests, demonstrating that the personalization feature is functioning correctly. The dashboard provides multiple tabs, allowing users to explore all news, local news, preferred news, and liked articles efficiently.

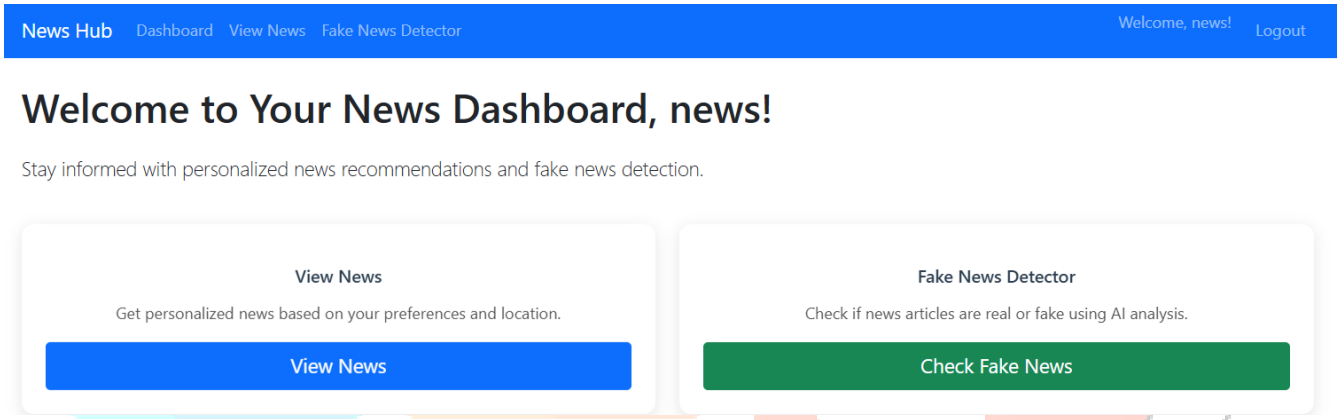

Fig.3.Main Dashboard

The AI-based filtering using Google Gemini proved effective in categorizing articles and removing irrelevant content. In tests, articles unrelated to a user's chosen category were accurately excluded, while borderline articles were retained to ensure leniency. This approach reduced noise in the recommendations and improved the relevance of displayed news. The combination of AI classification and collaborative filtering from user interactions allowed the system to dynamically adjust to changing user interests over time.

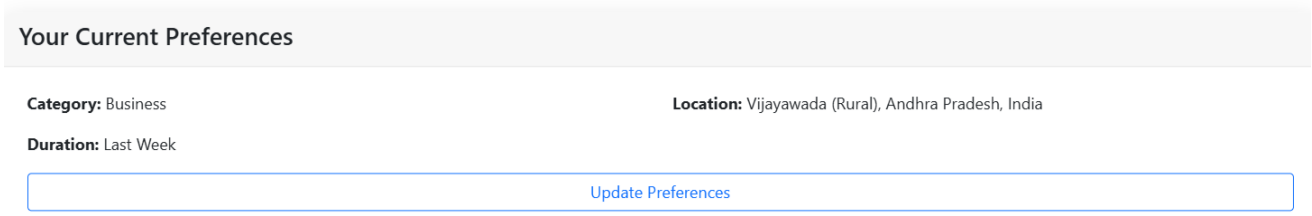

Fig.4.Current Preferences

Fake news detection results showed that the system can provide users with a preliminary assessment of article credibility. Using AI to evaluate source reliability, language tone, and factual accuracy, the system flagged potentially unreliable articles and assigned confidence scores. While this automated evaluation is not a substitute for full fact-checking, it provides valuable guidance for users and adds a layer of trustworthiness to the news consumption experience.

Fig.5.Quick Stats

Overall, the system demonstrates the effectiveness of integrating AI-driven content classification, personalized recommendations, and credibility checks in a single platform. User engagement increased when articles aligned with their interests, confirming that personalized recommendations enhance usability. However, limitations such as dependency on external APIs and occasional misclassification indicate areas for future improvement. The results validate the methodology and show that AI-assisted news aggregation can provide an interactive, relevant, and credible news experience.

4.2 Conclusion

AI-powered personalized news aggregator successfully integrates multiple data sources, user preferences, and machine learning techniques to deliver relevant and credible news content. By combining AI-based article classification, collaborative filtering, and fake news detection, the system provides a tailored and trustworthy news experience for each user. Testing and implementation show that the framework improves engagement, reduces irrelevant content, and assists users in accessing news aligned with their interests. While limitations exist, such as dependency on external APIs and occasional misclassification, the project demonstrates the potential of intelligent news recommendation systems and sets a foundation for future enhancements in personalization and content verification.

4.3 Future Scope

- Integration with More News Sources – Expand the system to include additional global and regional news APIs for broader coverage.
- Real-Time Updates – Implement real-time news streaming to provide instant notifications for breaking news.
- Advanced User Profiling – Use deeper behavioral analytics and machine learning to refine user preferences over time.
- Multilingual Support – Incorporate language translation to offer news in multiple languages for diverse users.
- Enhanced Fake News Detection – Integrate more sophisticated AI models and cross-checking with fact-checking databases to improve credibility assessment.
- Mobile Application Development – Extend the platform to mobile devices for better accessibility and on-the-go news consumption.
- Social Media Integration – Include social media feeds and interactions to analyze trending topics and user engagement.
- Personalized Alerts and Recommendations – Implement AI-driven notifications and recommendations based on real-time user interests and reading history.

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