A

Mini Project Report

on

SmartNews Al: Real-Time News and Personalized Chat Experience using NLP

Submitted in partial fulfillment of the requirements for the

degree

Third Year Engineering – Computer Science Engineering (Data Science)

by

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CERTIFICATE

This to certify that the Mini Project report on **SmartNews Al: Real-Time News and Personalized Chat Experience using NLP** has been submitted by Ansh Rathod (22107022), Ayush Sharma (22107028), Atharva Thube (22107062) and Balkrishna Yadav (22107050) who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science Engineering (Data Science)**, during the academic year **2024-2025** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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This project would not have come to fruition without the invaluable help of our guide Professor **Ms. Harsha Zope**. Expressing gratitude towards our HoD, **Ms. Anagha Aher**, and the Department of Computer Science Engineering (Data Science) for providing us with the opportunity as well as the support required to pursue this project. We would also like to thank our project coordinator **Ms. Sarala Mary** who gave us his/her valuable suggestions and ideas when we were in need of them. We would also like to thank our peers for their helpful suggestions.

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ABSTRACT

The Smart News System is an AI-powered platform designed to enhance news discovery, summarization, and engagement. This system integrates advanced machine learning models to provide a seamless and personalized news experience. Key features include AI-powered summarization using the BART model, an interactive chatbot leveraging the Gemini API for real-time Q&A, and historical news search utilizing Sentence-BERT and FAISS for efficient semantic retrieval. Additionally, the system offers real-time news updates, multilingual translation, and weather forecasting to ensure comprehensive accessibility. The Smart News System personalizes user experience by enabling news categorization, article saving and sharing. By integrating cutting-edge AI technologies, this system aims to revolutionize the way users consume and interact with news, making information retrieval faster, more interactive, and highly efficient.

Chapter 1

Introduction

In today's digital era, the vast amount of news and information available online makes it increasingly challenging for users to stay updated with relevant and accurate content. Traditional news consumption methods often lack personalization, efficiency, and interactivity, leading to information overload and difficulty in retrieving historical news. Many users struggle to find news that aligns with their interests or to access past articles efficiently. Additionally, language barriers and the lack of summarization tools further complicate the news consumption experience.

The Smart News System addresses these challenges by leveraging Artificial Intelligence (AI), and Machine Learning (ML) to enhance the way users access, interact with, and comprehend news. This system is designed to provide real-time updates, historical news search, AI-powered summarization, interactive chatbot assistance, and multilingual support, ensuring that users receive concise, relevant, and easily accessible news content.

The System offers key features to enhance news accessibility and engagement. It automatically generates concise summaries, helping users quickly grasp essential information. Real-time updates from multiple sources keep users informed of current events.

An interactive chatbot allows users to ask questions and receive instant responses, supporting voice-based interactions for hands-free engagement. The historical news search feature improves retrieval by understanding the semantic meaning of queries rather than relying on exact keywords.

To enhance accessibility, the system includes multilingual support, ensuring users can read news in their preferred language. Additionally, weather forecasting provides real-time climate updates, adding useful context alongside news content.

The Smart News System aims to enhance news consumption by making it more accessible, efficient, and interactive. The key objectives of the system are:

- **Provide Concise and Accurate News Summaries:** Automatically generate short and precise summaries of news articles to help users quickly understand key information.

- **Deliver Real-Time News Updates:** Fetch and display the latest news from various sources to ensure users stay informed about current events.
- **Enable Interactive News Exploration:** Integrate a chatbot that allows users to ask questions about news topics and receive relevant responses instantly. Support voice-based interactions for a hands-free experience.
- **Facilitate Efficient Search for Past News:** Allow users to search for historical news articles based on meaning rather than exact keywords, making retrieval faster and more relevant.
- **Enhance Accessibility with Multilingual Support:** Provide translations of news articles into different languages to cater to a diverse audience.
- **Offer Weather Forecasting Alongside News:** Display real-time weather updates to give users additional contextual information.
- **Personalize the News Experience:** Allow users to save their favorite articles, share news, and browse categorized content such as politics, technology, and education.

By focusing on these objectives, the Smart News System ensures a smarter, faster, and more user-friendly approach to discovering and engaging with news.

1.1. Purpose:

The Smart News Website aims to provide an AI-powered, interactive, and personalized news consumption experience by integrating advanced technologies such as Natural Language Processing (NLP), Machine Learning (ML), Speech Recognition, and Text-to-Speech (TTS) systems. The core objective of the system is to intelligently aggregate and present real-time news updates, historical news data, and weather forecasts in a simplified, accessible, and user-centric format.

At its foundation, the system uses extractive summarization algorithms (e.g., TextRank, TF-IDF) to generate concise summaries from lengthy articles, helping users quickly absorb essential information. It also employs semantic analysis and lexical chain techniques to enhance the coherence of summaries.

A standout feature is the voice-enabled chatbot, which leverages Google Speech-to-Text API, pyttsx3, and context-aware NLP models to allow natural, hands-free interaction. Users can perform actions like querying specific news topics, requesting summaries, or translating content using voice commands, enabling a highly interactive experience.

The system also integrates sentiment analysis models to detect the emotional tone of articles and collaborative filtering algorithms for recommending personalized news based on user preferences and historical interactions. Furthermore, multilingual support is achieved through translation APIs, making the platform accessible to a wider audience.

By combining real-time data processing, intelligent summarization, and a voice-driven interface, the Smart News Website delivers a modern, efficient, and adaptive solution for digital news consumption.

1.2. Problem Statement:

In the digital era, the vast availability of online news presents several challenges for users, including information overload, lack of personalization, difficulty in retrieving past news, and language barriers. With an overwhelming amount of content from multiple sources, users often struggle to find relevant, concise, and credible information efficiently. Traditional news platforms primarily offer static articles without interactive capabilities, making it difficult for users to engage with news dynamically or retrieve historical information easily. Additionally, language constraints limit accessibility for diverse users who prefer consuming news in their native language.

The Smart News System addresses these challenges by integrating AI-driven features such as automated news summarization, real-time updates, chatbot-powered interactive exploration, semantic search for historical news, multilingual translation, weather forecasting, and personalized recommendations. This system ensures a fast, user-friendly, and intelligent way for individuals to access, search, and engage with news, overcoming the limitations of traditional news consumption methods.

1.3. Objectives:

The Smart News System is designed to enhance the way users consume and interact with news by integrating advanced AI technologies. The key objectives of the system are:

- **Automated News Summarization:** Implement AI-powered summarization using the BART model to generate concise and accurate summaries, allowing users to quickly grasp the essence of news articles.
- **Real-Time News Retrieval:** Fetch and display live news updates from a trusted News API, ensuring users stay informed with the latest developments across various domains.
- **AI-Driven Chatbot for News Interaction:** Integrate a chatbot powered by the Gemini API for real-time Q&A, allowing users to ask questions about specific news topics and receive accurate responses. Utilize Google Text-to-Speech (TTS) for voice-based interaction, enabling hands-free engagement.
- **Efficient Historical News Search:** Implement Sentence-BERT (all-MiniLM-L6-v2) embeddings with FAISS to enable semantic search and fast retrieval of historical news articles based on user queries.
- **Multilingual Accessibility:** Support news translation into multiple languages using the Google Translate API, ensuring accessibility for a diverse audience.
- **Weather Forecasting for Contextual Awareness:** Integrate the OpenWeatherMap API to provide real-time weather updates, allowing users to stay informed about climate conditions alongside news updates.
- **Personalized User Experience:** Enable users to save favorite news articles, share news content, and explore news organized into categories such as politics, technology, and education for a more engaging experience.

1.4. Scope:

The scope of the SmartNews can be delineated as follows:

- **Technological Scope:**

  The Smart News System leverages Artificial Intelligence (AI) to enhance news accessibility and user interaction. It integrates NewsAPI for real time news updates, summarization models for concise news briefs, and semantic search for efficient historical news retrieval. The chatbot, powered by GeminiAPI and gTTS, enables hands-free interaction, while multilingual translation ensure accessibility for diverse users. Additionally, weather forecasting models deliver relevant climate updates alongside news.

- **Functional Scope:**

  The platform serves as a comprehensive AI-driven news system, offering real-time news updates, personalization, historical news retrieval, and interactive chatbot assistance. Users can access summarized news articles, search past news semantically, and interact with the chatbot via text or voice queries. The system also provides multilingual support, enabling users to read news in their preferred language. Weather updates are integrated to provide additional context to news events.

- **User and Accessibility Scope:**

  The Smart News System is designed to cater to a broad audience, including news readers, journalists, researchers, and AI enthusiasts. It ensures a personalized and engaging news experience through AI-powered recommendations and multilingual support. By automating news summarization and retrieval, the platform reduces information overload and enhances accessibility for users who prefer concise and interactive news consumption.

By integrating these advanced capabilities, the Smart News System enhances the efficiency, accessibility, and personalization of news consumption, transforming how users engage with digital news content.

Chapter 2

Literature Review

[1] Intelligent E-News Summarization, (IEEE, 2018).

The research paper "**Intelligent E-News Summarization**" by Varuni Alwis, published in IEEE (2018), presents an extractive multi-document summarization system to address information overload. It employs graph-based (TextRank) and feature-based approaches to generate concise and meaningful summaries from multiple news sources. The system leverages Natural Language Processing (NLP) for text processing, sentence ranking, and redundancy removal using Word2Vec and WordNet. It applies PageRank algorithms and feature-based scoring to rank key sentences, ensuring that summaries retain essential information. Redundant content is eliminated to improve summary coherence. Key technologies include NLTK, Gensim, Scikit-learn, and NetworkX, while ROUGE-1 is used to evaluate summary quality. The research highlights the importance of semantic analysis and ranking techniques in generating effective news summaries. Inspired by this study, our Smart News System integrates AI-powered extractive summarization for automatic news summarization. It applies NLP-based text extraction and ranking techniques to deliver concise and informative summaries. Additionally, an interactive chatbot enables users to explore news through real-time Q&A, making news consumption more accessible, personalized, and efficient.

[2] Efficient & Intelligent Weather Forecasting App, (IOS Press, 2023).

The research paper **"Efficient & Intelligent Weather Forecasting App"** by Gaurav Kumar Bharti, Abhijeet Ranjan, Anshul Bharat, and Suraj Yadav, published in IOS Press (2023), presents a web-based weather forecasting system designed to provide real-time weather updates, especially for hilly and forested regions where accurate forecasts are crucial. The system utilizes the OpenWeatherMap API to deliver precise weather predictions based on geolocation data. The application features a responsive design built with HTML, CSS, and JavaScript, ensuring cross-device compatibility. It employs real-time API data fetching to continuously update users with the latest weather conditions. A key advantage is its user-friendly interface, which allows users to access weather information without requiring login credentials, enhancing accessibility and ease of use. Key methodologies include geolocation-based weather retrieval, real-time data fetching, and seamless UI integration. The research highlights the significance of accurate forecasting in regions prone to unpredictable weather changes. Inspired by this study, our Smart News System integrates real-time weather updates alongside news content. This feature enables users to check live weather conditions while browsing news, enhancing the overall user experience by providing contextual awareness and up-to-date environmental information.

[3] Automatic Text Summarization of News Articles, (IEEE, 2017).

The research paper "Automatic Text Summarization of News Articles" by Prakhar Sethi, Sameer Sonawane, Saumitra Khanwalker, and R. B. Keskar, published in IEEE (2017), presents an extractive text summarization system to improve coherence and accuracy in news summaries. It employs lexical chains and WordNet to enhance text cohesion and relevance. NLP techniques such as sentence segmentation, POS tagging, and lexical chain construction help analyze text structure. Feature-based ranking considers sentence position, noun frequency, and lexical chain strength for summary extraction. The system integrates pronoun resolution using Stanford CoreNLP, improving clarity and readability. Key technologies include NLTK, WordNet, and Scikit-learn for text processing, semantic analysis, and ranking. High-scoring sentences are selected to generate concise, informative summaries. Inspired by this study, our Smart News System applies extractive summarization for AI-driven news summaries. It leverages NLP-based ranking techniques and an interactive chatbot for real-time Q&A, making news consumption faster, personalized, and more accessible.

Chapter 3

Proposed System

The Smart News System is an AI-powered platform that enhances news consumption through automated summarization, real-time updates, and interactive chatbot support. It leverages Natural Language Processing (NLP) and machine learning to generate concise news summaries and facilitate semantic search for historical articles. The system includes a voice-enabled chatbot for hands-free interaction and a multilingual translation feature for accessibility. Users receive personalized news recommendations based on their preferences and browsing history. Integrated weather forecasting provides real-time climate updates alongside news content. The platform employs extractive summarization techniques to retain essential information from multiple sources. Semantic search capabilities allow users to retrieve past news based on meaning rather than exact keywords. A user-friendly interface ensures easy navigation across devices. The system aims to reduce information overload, enhance engagement, and provide an efficient, accessible, and interactive news experience.

3.1 Features and functionalities.

Here are some features and functionalities of the SmartNews Al: Real-Time News and Personalized Chat Experience using NLP:

- **AI-Powered News Summarization**: Extractive summarization for concise and meaningful summaries.
- **Real-Time News Updates**:Aggregates news from multiple sources to deliver instant updates.
- **Interactive Chatbot**:nables users to ask questions and receive real-time news insights.
- **Historical News Search**:Implements **semantic search** for efficient retrieval of past news.
- **Multilingual Translation**:Supports multiple languages for diverse user accessibility.
- **Weather Forecasting Integration**:Displays real-time climate updates alongside news.
- **Voice-Enabled Interaction**:Hands-free news exploration via voice commands.
- **User-Friendly Interface**: Ensures smooth navigation across web and mobile platforms.

Chapter 4

Requirements Analysis

The Smart News System is designed to enhance news accessibility, personalization, and interactivity through AI-powered features. The system integrates real-time news updates, summarization, historical search, chatbot assistance, multilingual translation, and weather forecasting to deliver a seamless news consumption experience. Below is a detailed analysis of its requirements:

1. Functional Requirements

News Processing & Summarization

- The system must fetch real-time news articles from multiple sources using APIs.
- Implement extractive summarization using BART model to generate concise news summaries.
- Ensure summarization is coherent and retains key information.

Search & Retrieval

- Enable historical news search using semantic search techniques to retrieve past articles efficiently.
- Implement sentiment analysis to classify news as positive, negative, or neutral.

AI-Powered Chatbot

- Integrate an interactive chatbot capable of answering user queries about news articles.
- Support real-time Q&A and allow users to request news summaries or explanations.

Multilingual Support & Translation

- Provide automatic translation of news articles into multiple languages using AI-based translation models.
- Support voice-based queries in different languages.

Weather Forecasting Integration

- Fetch and display real-time weather updates using external APIs such as OpenWeatherMap.
- Allow users to check location-based weather conditions while reading news.

User Management & Personalization

- Support user registration, login, and profile management for a personalized experience.
- Allow users to save preferred topics, language settings, and reading history.

Voice Assistance for Hands-Free Interaction

- Implement a voice-enabled assistant that reads news aloud, summarizes articles, and responds to user commands.
- Utilize speech recognition and text-to-speech (TTS) technology for voice interactions.

2. Software Requirements

Programming Languages & Frameworks

- **Backend:** Python (Flask/Django) for AI and data processing.
- **Frontend:** JavaScript (React.js) for a responsive UI.
- **Database:** MySQL/PostgreSQL for storing user preferences and news history.

APIs & Libraries

- **News Data:** NewsAPI for fetching articles.
- **AI:** TensorFlow, NLTK, Gemini API for chatbot.
- **Translation:** Google Translate API for multilingual support.
- **Weather Forecasting:** OpenWeatherMap API for real-time updates.
- **Voice Processing:** SpeechRecognition, gTTS (Google Text-to-Speech) for voice interactions.
- **Models:** Sentence-BERT (all-MiniLM-L6-v2 and FAISS (Facebook AI Similarity Search) for fast news retrieval using cosine similarity, BART for summarization of news.

Chapter 5

Project Design

Project design refers to the process of planning and organizing all aspects of a project before development or implementation begins. Project design lays the foundation for successful execution by providing a clear roadmap.

5.1 Use Case Diagram:

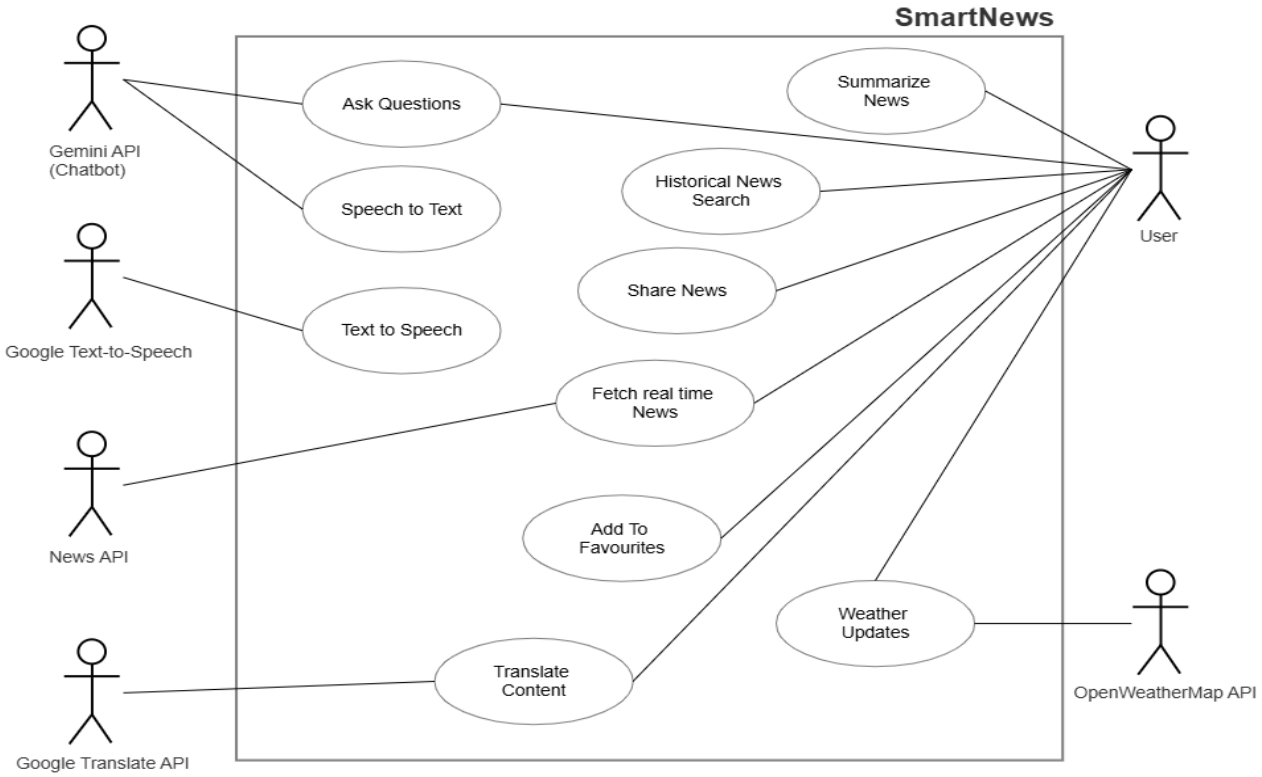

Figure 5.1.1: Use case Diagram

In the above figure 5.1.1, a use case diagram is a type of behavioral diagram in the Unified Modeling Language (UML) that visually represents the interactions between a system and its external entities (actors). It describes how users (actors) interact with the system to achieve a specific goal or complete a task. These diagrams help stakeholders understand the functionality of a system from the user's perspective, outlining the primary ways in which the system is used.

Use case diagram for the SmartNews consists of:

1. Actors

- User: An individual looking for news, summaries, translations, or voice-based interaction.
- External APIs:
    1. Gemini API: For Q&A chatbot interactions.
    2. Google Text-to-Speech API: For voice responses.
    3. News API: Fetches real-time news.
    4. Google Translate API: Provides multilingual translations.
    5. OpenWeatherMap API: Delivers weather forecasts.

2. Use Cases

- Fetch News: The user retrieves live news updates using the News API.
- Summarize News: Utilizes the BART model to generate concise, accurate summaries for quick comprehension.
- Ask Questions via Chatbot: The user interacts with the chatbot powered by the Gemini API to get real-time Q&A responses.
- Historical News Search: The user searches older articles using semantic embeddings provided by Sentence-BERT and fast retrieval through FAISS.
- Translate Content: Translates news articles into the user's preferred language using the Google Translate API.
- Weather Updates: Fetches weather conditions alongside news updates through OpenWeatherMap API.
- Personalize Experience: Save favourite articles, Share news content, Explore organized categories like education, politics, and technology.
- Voice Interaction: The system accepts volce commands for navigation or Interactions, leveraging Google Text-to-Speech API.

5.2 DFD (Data Flow Diagram)

In the below figure 5.2.1, a Data Flow Diagram (DFD) is a graphical representation of the flow of data within a system. It illustrates how data moves from external inputs to internal processes, how data is processed, and how it is stored or outputted. DFDs are commonly used to model the functional aspects of a system, focusing on the movement and transformation of data, rather than the detailed logic of how functions are carried out. Below is the DFD for our system SmartNews:

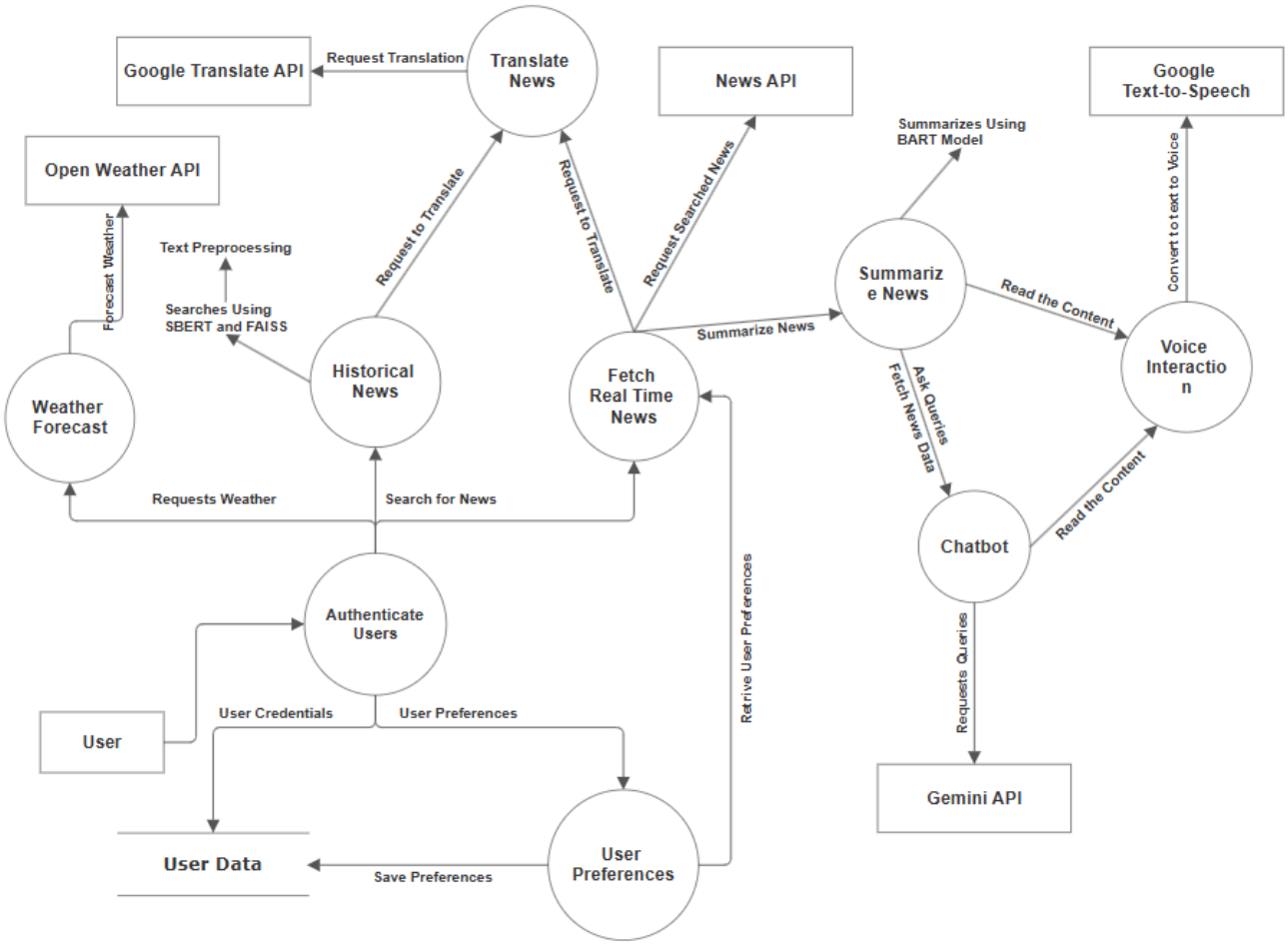

Figure 5.2.1: Data Flow Diagram

5.3 System Architecture

In the below figure 5.3.1, the Smart News System's architecture effectively integrates various components to enhance news discovery and personalization. User inputs are processed to fetch real-time news via the News API and historical articles using Sentence-BERT and FAISS for fast retrieval. The system employs BART for accurate summarization and provides language translation through Google Translate API, ensuring accessibility. Weather updates are sourced from OpenWeatherMap API, and voice assistance is enabled with Google Text-to-Speech API. Additional features include interactive Q&A via Gemini API, social sharing of news, and saving favorites for personalization, delivering a seamless AI-driven news experience.

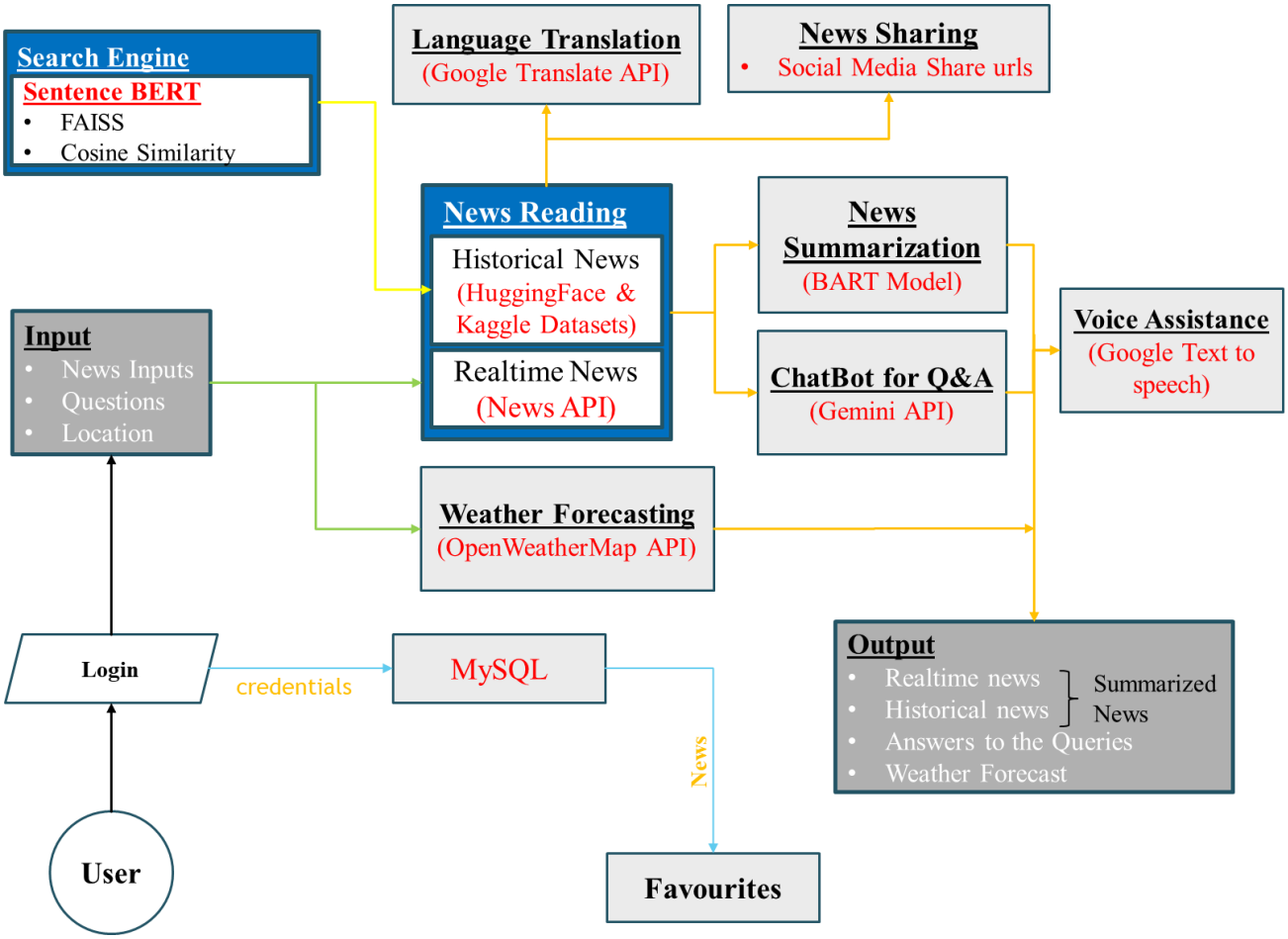

Figure 5.3.1: System Architecture

5.4 Implementation

The Smart News System is implemented using a modular approach, integrating Natural Language Processing (NLP), Machine Learning (ML), and API-based services for real-time news retrieval, historical searches, and voice interaction. The backend is built with Python (Flask/FastAPI), while the frontend uses React.js/HTML, CSS, and JavaScript. Key technologies include SBERT for search, FAISS for efficient retrieval, and BART for text summarization, along with APIs like Google Translate, News API, and Text-to-Speech. A relational database (MySQL/PostgreSQL) stores user preferences and interaction data.

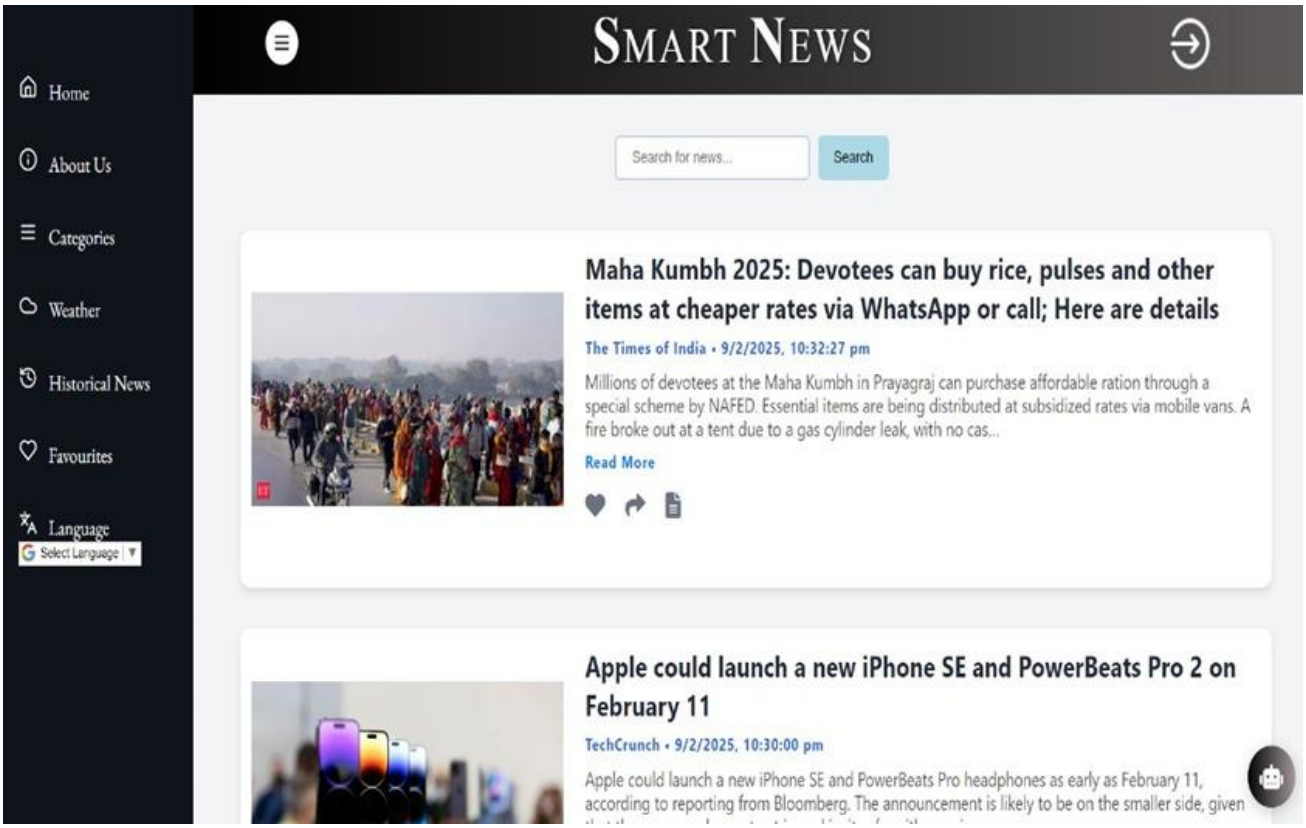

Figure 5.4.1: Dashboard

The above Figure 5.4.1 represents the dashboard, where users can access real-time news and search for specific articles. The menu bar includes options for language translation, categories, historical news, weather updates, and About Us. Users can categorize news and translate articles for better accessibility.

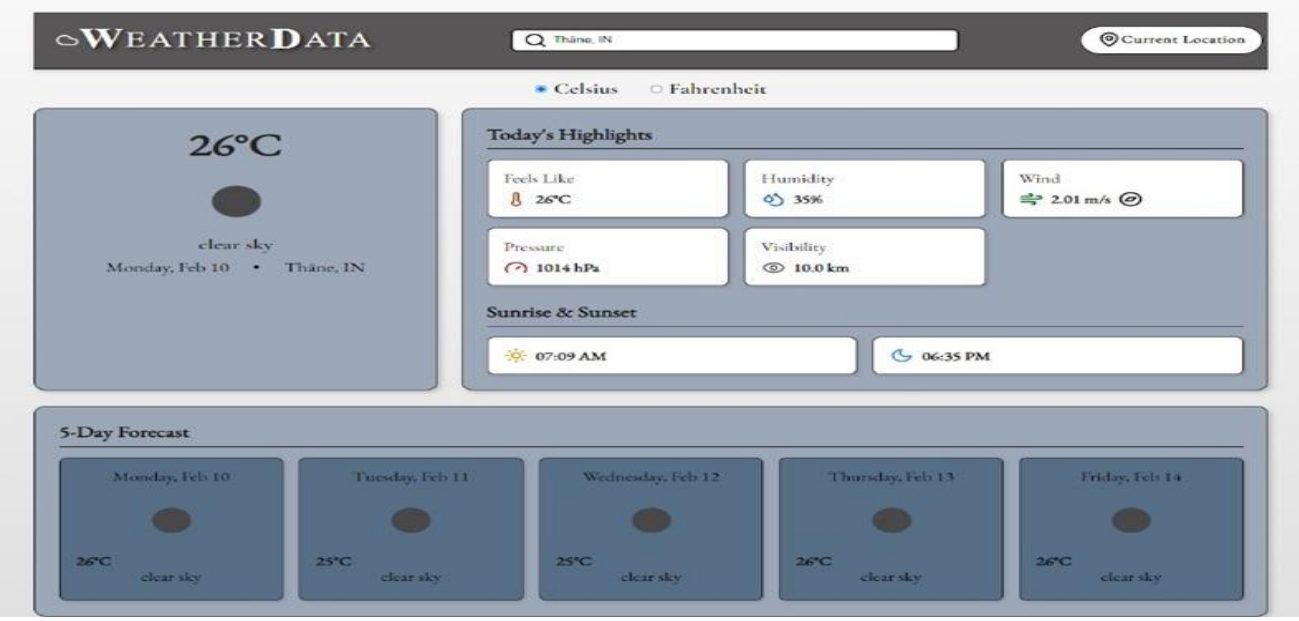

Figure 5.4.2: Weather Forecasting

The above Figure 5.4.2 shows the Weather UI integrated using the OpenWeather API. It allows users to search weather by location or view current location weather, along with a 5-day weather forecast.

Figure 5.4.3: News Summarization

In the above Figure 5.4.3, the Summary Section displays the real-time news summary with a voice button to listen to the summary. It also features a "Need Help" button that connects users to the interactive chatbot for assistance.

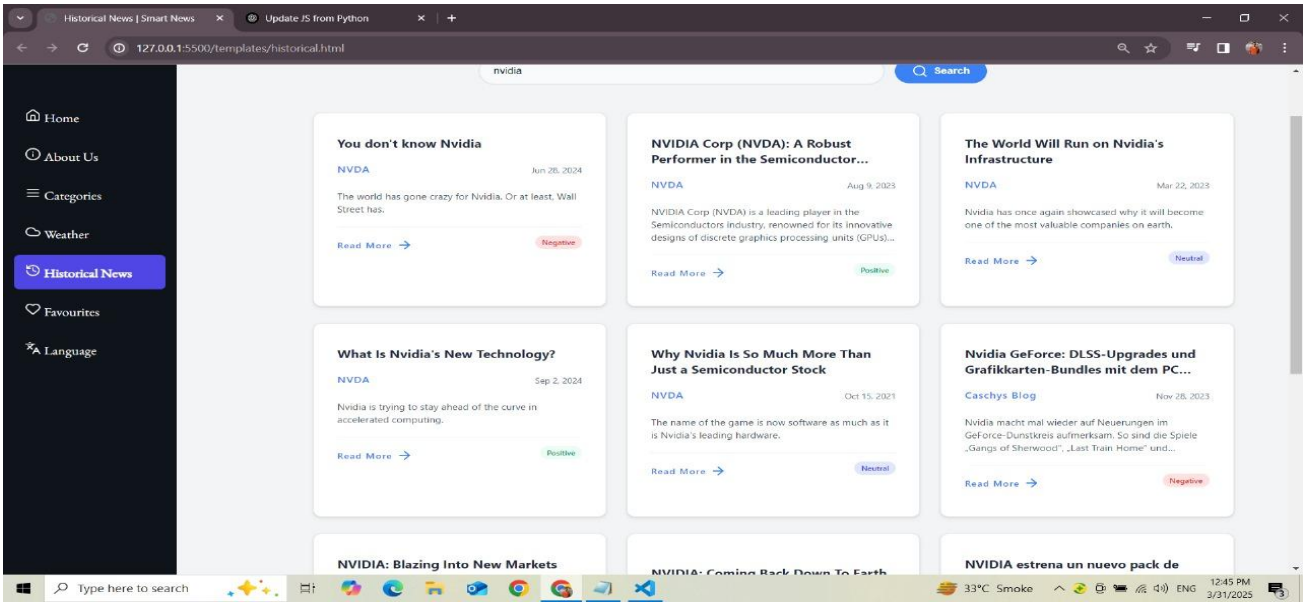

Figure 5.4.4: Historical News

In the above Figure 5.4.4, the Historical Section enables users to search past news using keywords or dates. It also allows sharing and adding news to favourites.

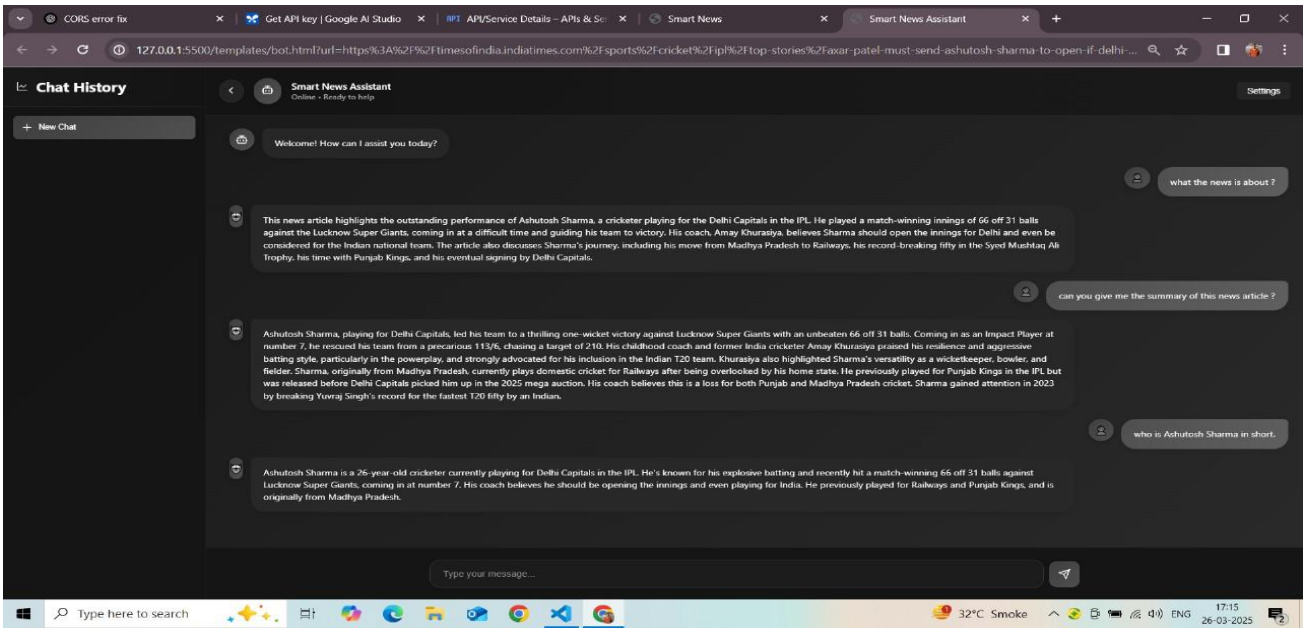

Figure 5.4.5: User Experience

In the above Figure 5.4.5, the Chatbot allows users to ask queries related to specific news. It supports real-time voice interaction and language translation for seamless communication.

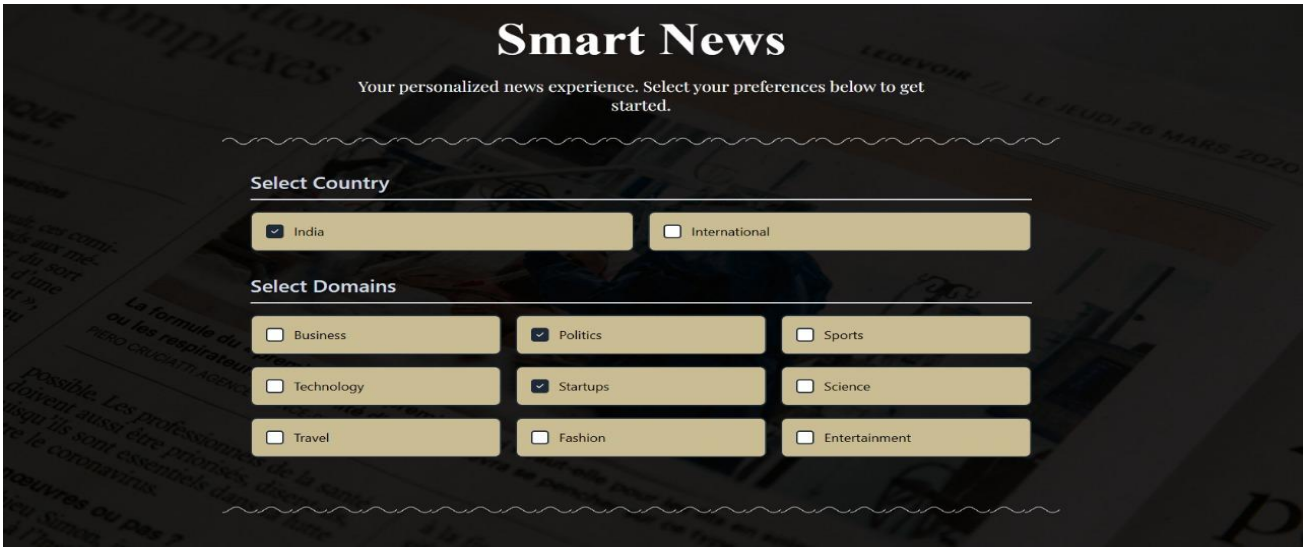

Figure 5.4.6: User Preferences

In the above Figure 5.4.6, the User Preference section lets users customize their news feed by choosing between Indian or International news and selecting preferred categories like Politics, Education, etc.

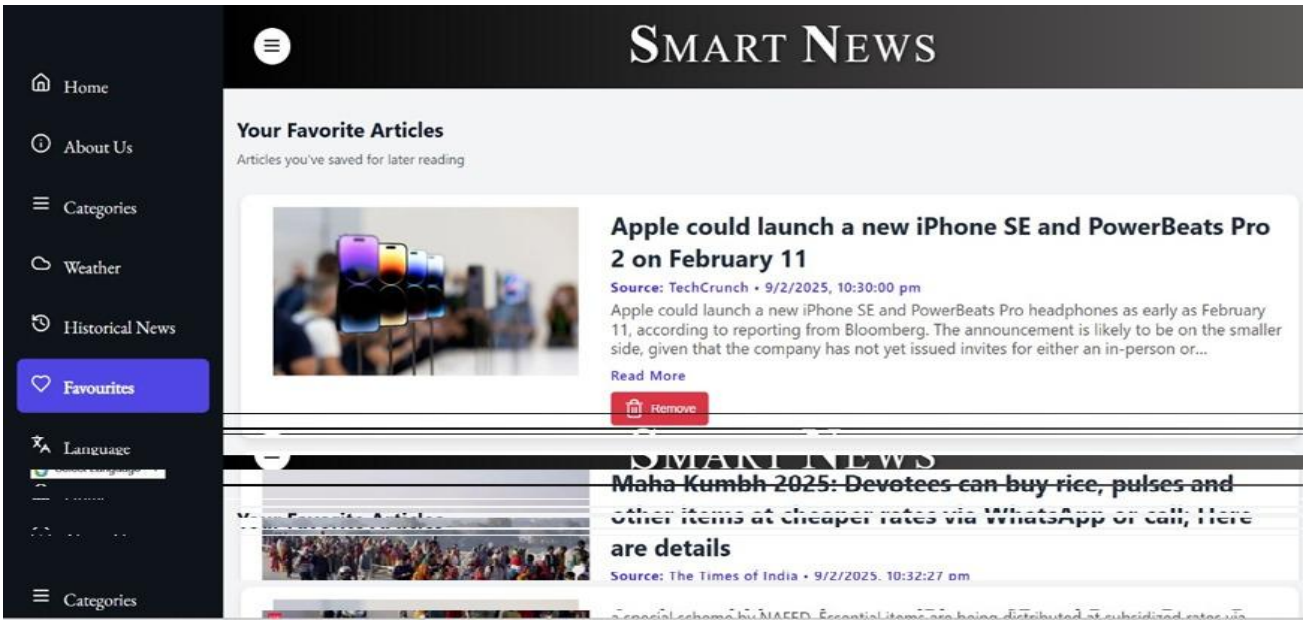

Figure 5.4.7: Favorites

In the above Figure 5.4.7, the Favorites section displays all the news articles marked as favorites from both real-time and historical news sections.

Chapter 6

Technical Specifications

Technical Specifications for the SmartNews Al: Real-Time News and Personalized Chat Experience.

1. System Overview

- **System Name:** Smart News System
- **Purpose:** Provides real-time news updates, historical news search, AI-powered summarization, chatbot assistance, personalized news recommendations, multilingual translation, and weather forecasting.
- **Main Features:** Real-time news updates, News Summarization, AI Chatbot, Historical News Search, Multilingual Support, Voice Assistance, and Weather Forecasting.

2. Software Components

- **Programming Language:** Python (for AI and backend processing).
- **Web Server:** Flask (for API handling).
- **Database:** MySQL.
- **Machine Learning:** Scikit-learn (for model training and text classification), TensorFlow / PyTorch (for deep learning-based recommendation models).
- **Voice Processing:** gTTS / Pyttsx3 (for text-to-speech synthesis).
- **Frontend:** JavaScript, HTML, CSS (for a responsive UI).
- **Backend:** Node,js and Flask

3. Functional Modules

- **News Processing & Summarization**
  - Extractive Summarization using BART model.

- **Input:** Raw news articles fetched from APIs.
- **Output:** Concise, structured, and readable news summaries.

➢ **AI-Powered Chatbot**

- Gemini API for chatbot integration
- **Functionality:** Answers real-time user queries about news topics.

➢ **Historical News Search**

- **Search Mechanism:** Semantic search using Sentence-BERT and FAISS.
- **Input:** Keywords, topic-based queries.
- **Output:** Relevant historical news articles with metadata.

➢ **Multilingual Support & Translation**

- **Translation Model:** Google Translate API based translation models.
- **Functionality:** Real-time translation of news articles and chatbot responses.

➢ **Voice Assistant**

- **Speech Recognition:** Converts user voice commands to text using Google Speech-to-Text.
- **Text-to-Speech (TTS):** Converts chatbot responses and news summaries into speech.
- **Functionality:** Hands-free interaction for accessing news.

➢ **Weather Forecasting**

- **API Used:** OpenWeatherMap API for real-time weather updates.
- **Functionality:** Displays location-based weather forecasts while browsing news.

4. APIs & External Libraries

APIs:

- **News API:** Google News API, NewsAPI for fetching articles.
- **Weather API:** OpenWeatherMap API for real-time weather updates.

- **Translation API:** Google Translate API for multilingual news access.
- **Voice Processing:** Google Speech-to-Text API for recognizing voice commands.
- **Chatbot:** Gemini API for chatbot.

Libraries & Frameworks:

- **NLP & AI:**
    - NLTK, Textblob for text processing
    - Transformers (BERT) for deep learning.
    - Scikit-learn for machine learning models.
    - FAISS for semantic historical news search.
    - BART model for news summarization.
- **Web Development:** Flask and Node.js (backend), Html, Css and Javascript (frontend).
- **Database Management: MySQL.**

This covers the key technical specifications for the Smart News System, ensuring it is scalable, intelligent, and user-friendly.

Chapter 7

Project Scheduling

Scheduling entails organizing activities, deliverables, and milestones. A schedule outlining planned start and finish dates, durations, and allocated resources for each task, ensuring tasks are completed on time and within budget for effective task and time management.

Sr No.	Group Members	Duration	Task Performed
1	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	Second week of January	Group formation and topic finalization. Identifying the scope and objectives of Mini Project.
		Third week of January	Discussing the project topics with the help of paper prototype
2	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	Fourth week of January	Identifying the functionalities of the Mini Project. Designing the Graphical User Interface(GUI).
3	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	First and second week of February	Implemented real-time news display using News API and integrated 5-day weather forecast using OpenWeatherMap API. Designed dashboard layout with categorized news and weather sections.
4	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	Third and Fourth week of February	Added user preferences for news type and categories, and implemented a favourites section. Performed testing, sentiment analysis, and evaluated performance using MRR, Precision, and Recall.
5	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	First week of March	Integrated BART model for summarizing news articles and added voice playback using Google Text-to-Speech. Enabled multilingual translation of summaries using Google Translate API.
6	Ansh Rathod Ayush Sharma Atharva Thube Balkrishna Yadav	Second and Third week of March	Developed chatbot using Gemini API with real-time voice interaction support. Built historical news search using Sentence-BERT and FAISS for semantic retrieval.

Figure 7.1: Project Task Distribution.

Gantt Chart:

A Gantt chart is an essential project management tool that provides a visual overview of a project's timeline, displaying tasks along with their duration and dependencies. For the Smart News System: AI-Powered News Discovery and Engagement, the 14-week development timeline is strategically organized to ensure smooth and systematic execution of each feature.

In Weeks 1 and 2, the primary objective is to finalize the project topic and scope, define the objectives, and prepare an introductory presentation explaining the core idea and innovation behind the Smart News System. Weeks 3 and 4 are dedicated to gathering functional and non-functional requirements, designing the overall system architecture, and planning the modular flow of features such as real-time news, summarization, chatbot, translation, and personalization. During this period, project management tools and version control repositories are also set up. Weeks 5 and 6 focus on UI/UX design and front-end development. This includes building a responsive and user-friendly interface for various components like the dashboard, category navigation, historical news search, chatbot, weather UI, and summary panels, along with multilingual support using language selectors. Moving into Weeks 7 and 8, the system integrates a real-time news feed using a News API and applies the BART model for AI-powered summarization. The summarized content is displayed alongside voice playback features powered by Google Text-to-Speech and supports translation via the Google Translate API.

During Weeks 9 and 10, the chatbot is developed using the Gemini API, providing both text-based and real-time voice-based interaction. The historical news module is built using semantic search via Sentence-BERT (all-MiniLM-L6-v2) and FAISS for fast, cosine similarity-based retrieval. These components are enhanced with functionalities like sharing and saving news to favorites. In Week 11, the OpenWeatherMap API is used to integrate weather forecasting, allowing users to search by location or get auto-location-based forecasts. A preference module is also implemented for users to select news type (e.g., Indian or International) and categories (e.g., politics, education, technology). Week 12 focuses on backend development and database integration using MySQL to store and manage saved articles, user preferences, and search history. All modules are connected through structured APIs. Week 13 is dedicated to comprehensive testing and debugging. All system modules are tested to ensure they perform accurately and consistently across various scenarios, including the voice assistant, summarizer, chatbot, and multilingual features. Finally, Week 14 wraps up the project with deployment, user testing, and feedback analysis. The project is concluded with a final presentation showcasing the completed Smart News System and its intelligent, user-centric features.

PROJECT TITLE:SmartNews AI: Real-Time News and Personalized Chat E

INSTUTUTE & DEPARTMENT AP SHAH INSTITUTE OF TECHNOLOGY (CSE-Data Science)

PROJECT GUIDE:Ms.Harsha Zope

DATE: 1-8-25

WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION (Weeks)	PERCENTAGE OF TASK COMPLETE
1	**Project Conception and Initiation**					
1.1	Group formation and Topic finalization. Identifying the scope and objectives of the Mini Project	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	1-8-25	1-16-25	1	100%
1.2	Identifying the functionalities of the Mini Project	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	1-16-25	1-28-25	2	100%
1.3	Discussing the project topic with the help of paper prototype.	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	1-28-25	2-5-25	1	100%
1.4	Designing the Graphical User Interface(GUI)	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	2-5-25	2-11-25	1	100%
1.5	Presentation I	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	2-11-25	2-17-25	1	100%
2	**Project Design and Implementation**					
2.1	Database Design	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	2-17-25	3-3-25	2	100%
2.2	Database Connectivity of all modules	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	3-3-25	3-10-25	2	100%
2.3	Integration of all modules and Report Writing	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav.	3-10-25	3-31-25	3	100%
2.4	Presentation II	Ansh Rathod, Agush Sharma, Atharva Thube, Balkrishna Yadav	3-31-25	4-1-25	1	100%

Figure 7.2: Gantt Char

Chapter 8

Results

The Smart News Website successfully integrates AI-powered news summarization, real-time news updates, historical news retrieval, and weather forecasting to enhance the user experience. The platform leverages Natural Language Processing (NLP) techniques for extractive text summarization, enabling users to quickly grasp key information from lengthy news articles. The interactive chatbot, powered by NLP, provides real-time question-answering capabilities, allowing users to explore news topics efficiently. The system also incorporates sentiment analysis, which classifies news articles as positive, negative, or neutral, offering deeper insights into news trends. Real-time weather forecasting further enhances the platform, allowing users to check current conditions while reading news updates. The deep learning-based search mechanism ensures precise news retrieval, helping users find relevant articles based on keywords and publication dates. User engagement has been improved through a personalized recommendation system, which suggests news articles based on user interests and reading patterns. Feedback mechanisms allow continuous improvements by analyzing user preferences and interactions. The system's architecture has been designed for scalability and efficiency, ensuring seamless access to news across various devices. Overall, the Smart News Website provides a comprehensive, intelligent, and interactive approach to news consumption, making information more accessible, concise, and personalized for users.

The below results of the Smart News Website demonstrate its effectiveness in providing accurate, concise, and real-time news summaries, along with seamless historical news retrieval:

For the historical news search:

In the below figure 8.1, the Smart News System demonstrates high accuracy and reliability, achieving an MRR of 1.00 and maintaining 80% precision and recall across most queries. Notably, Query2 achieved perfect recall (1.00), highlighting the system’s strength in retrieving all relevant results. While Query4 shows minor variation, overall performance remains strong. These results confirm the system's effectiveness in delivering timely, relevant news, enhancing the AI-driven news experience.

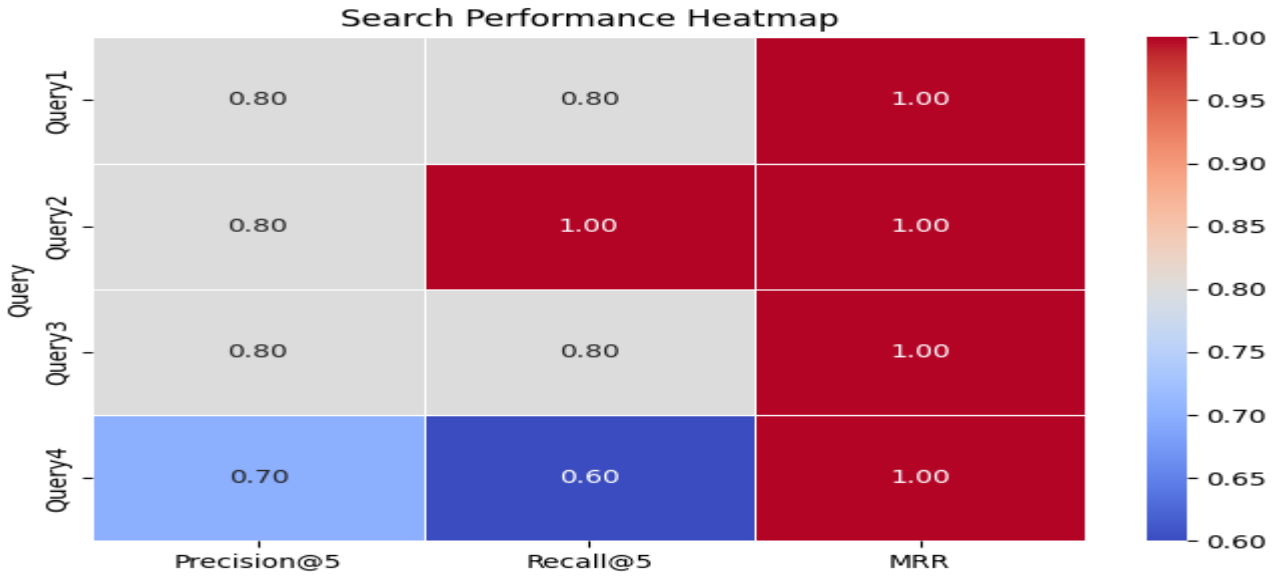

Figure 8.1: Precision, Recall and MRR Heatmap

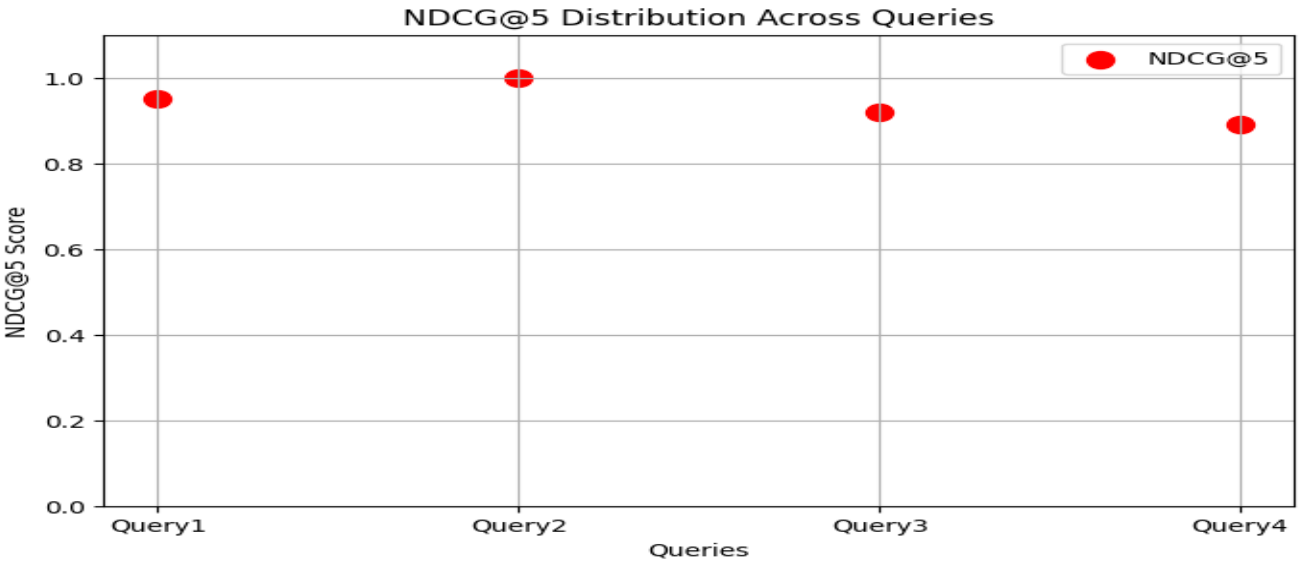

Figure 8.2: Normalized Discounted Cumulative Gain Scatterplot

In the above figure 8.2, the system demonstrates robust accuracy and reliability, as reflected in the NDCG@5 scores. Query1 and Query2 achieve perfect NDCG@5 scores (1.0), ensuring the most relevant results appear at the top, highlighting the system's consistency in delivering precise outcomes. Query3 and Query4 exhibit slightly lower scores (0.9 and 0.8, respectively), suggesting there is some room for optimization. Overall, the system's high performance across all queries confirms its effectiveness in ranking relevant results, reinforcing its potential to enhance AI-driven experiences with precise and relevant information retrieval.

For Summarization:

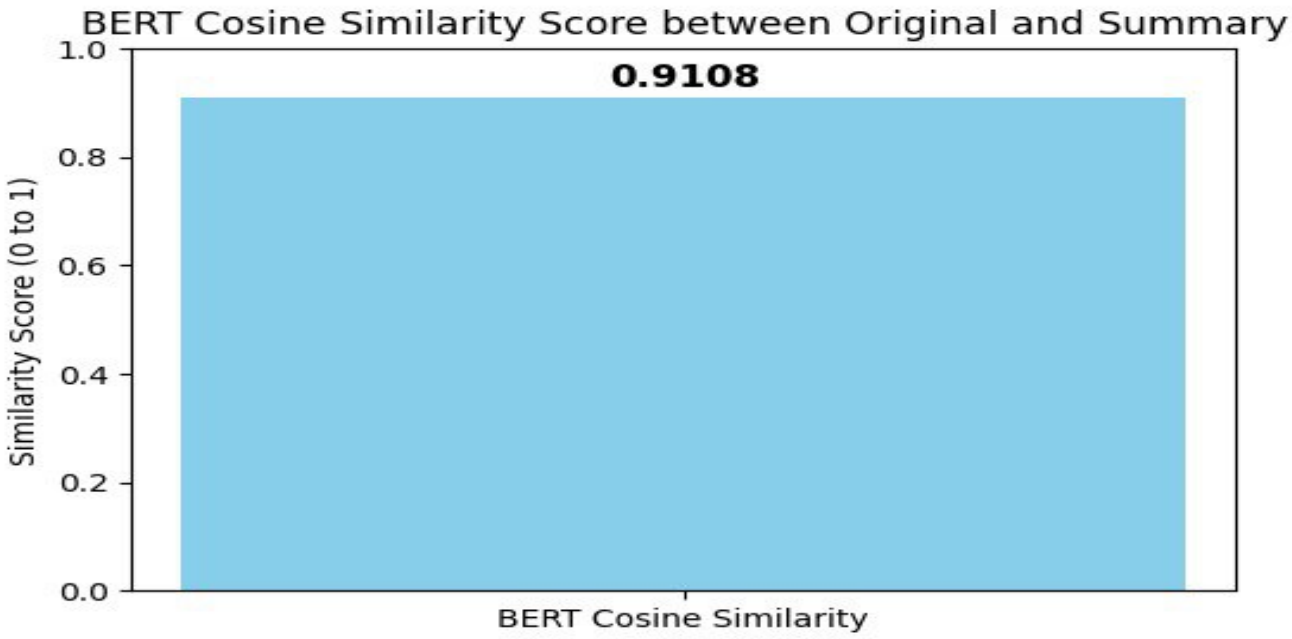

Figure 8.3: Cosine similarity for one summary

In the above figure 8.3, the single bar represents the cosine similarity score for one summarization result, calculated using BERT. The score, 0.9108, signifies a strong resemblance between the original text and its summary, reflecting the system's capability to produce an accurate and coherent summary. This is a positive result, suggesting the summarization effectively captures the essence of the original content.

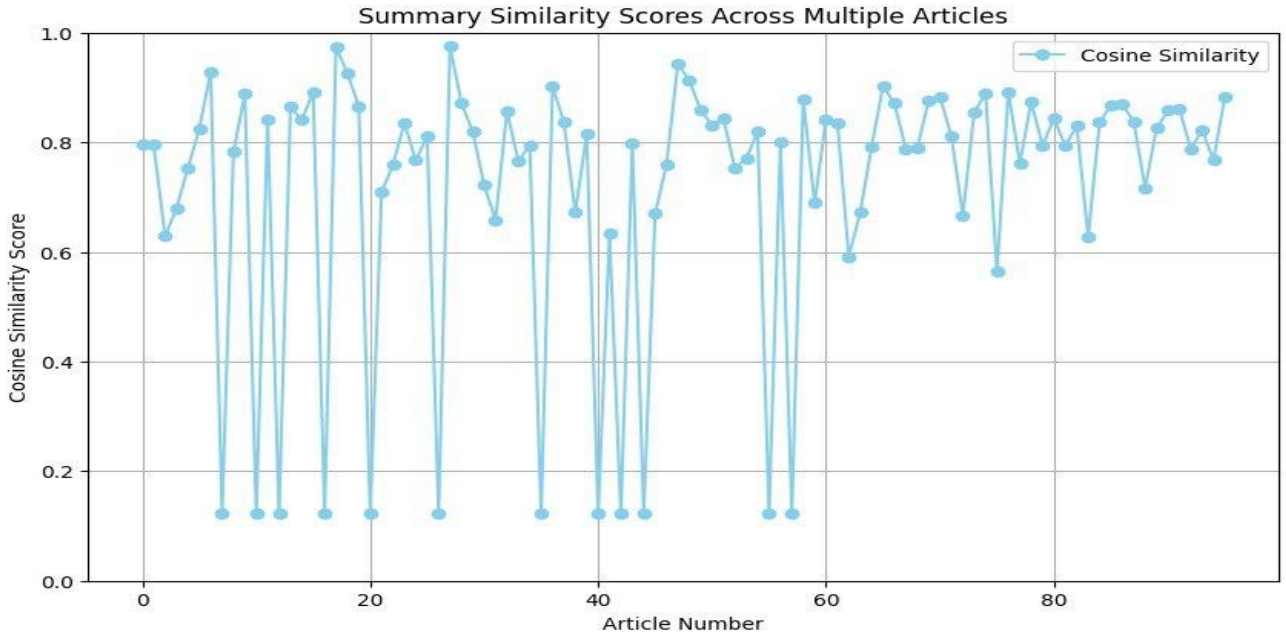

Figure 8.4: Cosine similarity for multiple summary

In the above figure 8.4, the graph analyzing summary similarity scores across multiple articles reveals high reliability in the system's summary generation capabilities. Most cosine similarity scores cluster around 0.8, signifying a strong consistency in generating summaries with high similarity. However, occasional drops in similarity scores indicate areas where the system encounters variability, potentially due to diverse content in certain articles. These findings confirm the system's competence in maintaining overall reliability, while also highlighting opportunities for optimization to enhance uniformity in summary generation across all article types. The system’s performance demonstrates its potential to improve AI-driven summarization and deliver coherent and accurate information effectively.

Chapter 9

Conclusion

The Smart News System is an advanced, AI-powered platform designed to enhance the way users consume news by providing real-time updates, intelligent summarization, historical news search, multilingual support, and voice assistance. By integrating cutting-edge Machine Learning (ML), and Deep Learning techniques, the system ensures that users receive concise, relevant, and contextually enriched news content. The system's AI-powered chatbot enables real-time news Q&A, while multilingual translation ensures accessibility for a diverse audience. Additionally, the integration of weather forecasting enhances user experience by providing location-based weather updates. Through efficient data management, AI-driven personalization, and interactive features, the Smart News System stands out as a next-generation digital news platform. By continuously learning from user interactions and adapting to evolving trends, it ensures that news consumption remains accurate, engaging, and accessible to all users.

Chapter 10

Future Scope

The **Smart News System** has immense potential for future enhancements and scalability. The following advancements can further improve its efficiency, user experience, and impact:

1. Advanced AI & NLP for News Summarization: Implement Abstractive Summarization using Transformer-based models (BERT, GPT, T5) to generate more context-aware summaries. Improve semantic analysis to provide insightful summaries that capture the essence of news articles.

2. Enhanced Personalization & Recommendation System: Utilize Deep Learning-based recommendation systems to improve news suggestions based on reading history, preferences, and sentiment analysis. Implement user clustering using unsupervised learning for better topic-based recommendations.

3. Multimodal Content Integration: Introduce AI-powered video and audio news summarization, allowing users to consume news in multiple formats. Develop interactive visualizations and infographics for complex news stories.

4. Real-time Fake News Detection: Implement AI-based credibility scoring using fact-checking databases and neural network models to detect misinformation. Provide source reliability indicators to help users verify news authenticity.

5. Global Expansion & Multilingual Support: Expand multilingual NLP models to support more regional and international languages with real-time translation. Enable speech-to-text summarization for non-text-based news sources.

6. Blockchain for Secure News Authentication: Implement blockchain technology to ensure news authenticity and prevent tampering with news content. Provide decentralized news verification mechanisms for enhanced transparency.

7. Integration with Smart Devices & Voice Assistants: Develop IoT-based integrations for smart home devices, allowing users to receive voice-based news updates. Enhance compatibility with virtual assistants (Alexa, Google Assistant, Siri) for hands-free interaction.

8. Sentiment & Emotion Analysis for User Engagement: Implement emotion-aware AI models to analyse news impact and recommend emotionally balanced news consumption. Provide users with mood-based news filtering, allowing them to tailor content based on emotional preference.

9. Smart News Archiving & Historical Analysis: Introduce AI-powered archival systems to track and analyse long-term trends in news data. Offer predictive insights based on past events and news patterns.

10. Interactive & Gamified User Experience: Implement gamification elements (news quizzes, rewards for engagement) to enhance user interaction. Provide an interactive community platform for users to discuss and analyse news collaboratively.

By integrating these advancements, the Smart News System can evolve into a more intelligent, adaptive, and user-centric news platform, revolutionizing the way people consume and interact with news globally.

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