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REVIEW PAPER

**"Enhancing Movie Ticketing Systems with Aspect-Based Sentiment Analysis and Voice Feedback Integration"**

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**Abstract:**

**The goal of this research is to create a novel aspect-based sentiment analysis system that classifies and assesses consumer reviews according to particular aspects of films. By utilizing these multifaceted sentiment insights, the system hopes to improve personalized movie suggestions and offer a more complex and customized user experience. The project will build a comprehensive taxonomy of movie features, train models to conduct sentiment analysis on each aspect, and develop a recommendation engine that makes use of these aspect-based sentiment scores using cutting-edge natural language processing and machine learning techniques. The suggested solution will be integrated with advanced personalization, predictive analytics, and interactive visualizations in a web application built using Django.**

**Keywords:**

Aspect-Based Sentiment Analysis (ABSA), Voice Feedback Integration, Movie Ticketing System, Sentiment Classification, Speech Recognition, User Experience Enhancement

**1.Introduction:**

The widespread availability of social media feedback and online reviews has created new opportunities for bettering product recommendations and comprehending customer preferences. Conventional movie recommendation systems frequently depend on content-based and collaborative filtering techniques. [1][4] Although these methods work well, they usually handle user reviews as a single, undifferentiated viewpoint, which leaves out the complex thoughts people may have about many aspects of a film.   
To overcome this constraint, the present work suggests an aspect-based sentiment analysis method. The method can offer more detailed insights into consumer preferences by dissecting movie reviews into discrete parts and examining the mood toward each. Subsequently, these insights are applied to improve the accuracy and customization of personalized movie suggestions based on user preferences [5][6].

**2.Introduction to Aspect-Based Sentiment Analysis and Voice Feedback**

The fundamental idea of Aspect-Based Sentiment Analysis (ABSA) is presented in this section, along with its importance in fine-grained customer feedback analysis that focuses on certain features of goods, services, or experiences. The introduction also emphasizes how voice feedback is becoming more and more important in contemporary sentiment analysis systems, particularly as speech recognition and natural language processing (NLP) technologies progress. ABSA allows for a more detailed sentiment classification by segmenting user comments into discrete elements. Conventional approaches mostly focus on text-based inputs, but the growing usage of speech data presents fresh chances for more profound comprehension, especially when it comes to identifying the emotional undertones in customer reviews. Voice input gives ABSA another level of context, where prosody, tone, and tempo are important factors in determining sentiment.

**3. Deep Learning Approaches in Aspect-Based Sentiment Analysis**

This section concentrates on how deep learning methods can improve ABSA, especially when voice data is used. Deep learning models provide more accuracy and flexibility in sentiment classification by processing both text and voice inputs. Convolutional neural networks (CNNs) and recurrent neural networks (RNNs), two models that can interpret intricate data patterns, have been introduced by deep learning, revolutionizing ABSA. Performance is enhanced by these models' exceptional ability to extract features and emotions from speech and text inputs. Textual and audio data are combined in multimodal analysis to give a thorough grasp of user sentiment. Sophisticated models that can process speech data, extract elements like tone and emotional context, and combine them with text-based insights for a more accurate sentiment categorization are needed to integrate various modalities.

**4. Real-Time Sentiment Analysis in Voice Assistants**

The use of real-time ABSA in voice assistant systems, which demand instant processing and response, is covered in this section. ABSA is being used more and more by voice assistants like Alexa and Siri to improve user interactions by identifying the particular sentiment associated with various conversational elements. Issues with real-time sentiment analysis in voice assistants include processing speed, speech recognition quality, and context interpretation. Since these systems need to respond instantly, effective and extremely precise emotion and aspect extraction models are required. Voice-based sentiment analysis heavily relies on prosody, which includes components like tone, rhythm, and stress. Comprehending prosody aids in identifying user emotions, which is especially advantageous for voice assistants that seek to react in a contextually relevant and emotionally sensitive way.

**5. Voice Feedback in Customer Service Applications**

Understanding consumer attitudes through voice feedback is extremely beneficial, particularly in service-oriented companies. This section examines the ways in which speech data improves the sentiment analysis process generally and is utilized to extract particular elements pertaining to customer experiences. Because users are more inclined to vocalize their emotions, voice feedback in customer service offers richer sentiment data. Based on real-time sentiment analysis, businesses can address particular issues and enhance service quality by extracting elements from spoken feedback. Sentiment categorization accuracy increases when voice data is integrated with conventional text analysis. Customer sentiment, which is sometimes obscured in text-only feedback, can be determined in large part by emotional indicators that are present in voice, such as satisfaction or irritation.

6. **E-Commerce and Voice-Enhanced Sentiment Analysis**

Voice feedback's incorporation into ABSA for e-commerce platforms presents fresh chances to gain a more detailed insight of consumer sentiment. This section looks at how speech data can be utilized to better understand particular product qualities by analyzing reviews, ratings, and customer interactions. Voice feedback is used in e-commerce to assist companies understand the opinions of customers who would rather talk than type. By enabling voice-based searches, reviews, and product feedback, it improves the user experience and provides a more engaging and user-friendly method of obtaining consumer data. E-commerce platforms can extract attitudes related to product attributes like quality, price, and usability by analyzing voice-based feedback. Better customer satisfaction and more individualized product recommendations are made possible by this, which eventually boosts engagement and sales.

**7. Future Directions and Challenges in Voice-Based ABSA**

Future directions for voice-enhanced ABSA are covered in this part, along with issues that must be resolved, like increasing the precision of speech recognition, managing multilingual data, and effectively processing real-time feedback. ABSA will depend more and more on voice data in the future, particularly as voice search, smart home appliances, and virtual assistants become more popular. Advances in AI and deep learning will improve the accuracy, context awareness, and real-timeness of voice sentiment analysis. Speech recognition in loud situations, managing numerous languages and dialects, and guaranteeing real-time processing are challenges in voice-based ABSA. To guarantee the appropriate implementation of voice-based sentiment analysis systems, researchers must also concentrate on the ethical ramifications of voice data gathering, including concerns about privacy and permission.

**8.1System Overview**

The proposed system function as follows:

**Aspect-Based Voice Feedback**

This session focuses on using Aspect-Based Sentiment Analysis (ABSA) to record and examine user feedback via voice inputs. The technology will provide deeper insights into user preferences by recognizing discrete parts of movies (e.g., acting, storyline, directing) and assessing the sentiment associated with each aspect.   
**Voice Feedback Capture**: User voice inputs will be transcribed and examined using sophisticated speech recognition software. Important elements will be recognized, including music, cinematography, and performance.  
**Sentiment Extraction**: To identify emotional tones like enthusiasm, annoyance, or contentment, the vocal response will be subjected to sentiment analysis. To increase the precision of sentiment identification, prosody elements like tone, pitch, and tempo will be taken into account.   
  
**Aspect Sentiment Mapping:** A sentiment score will be assigned to each recognized aspect depending on

**Model Prediction**

This part is in charge of making movie suggestions based on the sentiment analysis findings from both voice and text input. The predictive model will improve the precision and customization of movie suggestions by utilizing machine learning techniques.   
**Sentiment-Based Recommendation Engine**: By examining the sentiment scores of various movie elements, the model will be trained to forecast user preferences. The recommendation engine will provide suggestions for related films based on positive opinions about particular elements (such as excellent acting or an exciting plot).  
**Personalized Prediction:** The system will continuously update user profiles and forecast future preferences based on historical feedback data, including both text and speech. This makes it possible to provide recommendations that are dynamic and customized to each user's preferences.   
 **Real-Time Predictions:** By incorporating sentiment analysis from real-time voice, the suggestions

**8.2 Dataset and Model Training**

The success of the proposed system relies heavily on a robust dataset and effective model training. This section outlines the key components related to the data collection process, feature extraction, and model training methodologies used to develop the sentiment analysis and recommendation engine.

**1. Dataset Collection**

A large dataset of both text and voice reviews will be used to train the model for aspect-based sentiment analysis and voice feedback integration. User reviews of a variety of films, with an emphasis on acting, plot, music, and cinematography, will be included in the dataset.

**Textual Data:** We'll gather user reviews from social media and online movie platforms. To guarantee successful model training, these reviews will be annotated for various movie characteristics and sentiment labels (positive, negative, and neutral).

**Voice Data:** User recordings will be used to collect voice feedback. After that, these recordings will be transcribed using voice recognition software and annotated with prosody features like pitch and tone, just like text data.

**Aspect Annotations:** Data will be annotated in both text and speech.

**2. Model Training**

In order to create a sentiment analysis system that can interpret both text and speech inputs, deep learning techniques will be used during the model training phase.   
**Text Sentiment Analysis:** To extract aspect-specific sentiment scores, the textual data will be trained on a recurrent neural network (RNN) or long short-term memory (LSTM) model. These algorithms will be able to recognize pertinent elements of the film and give them sentiment scores. **Voice Sentiment Analysis:** Speech patterns, prosody, and emotional tone will be examined using convolutional neural networks (CNNs) in conjunction with LSTM for voice data. The model's ability to effectively estimate sentiment based on both textual content and vocal subtleties is ensured by this multimodal approach.   
  
**Aspect-BasedClassification:** The model will be trained to categorize every user review according to its aspects and

**8.3 Result and Performance**

The proposed system was evaluated for its effectiveness in both aspect-based sentiment analysis and voice feedback integration. To assess the model's performance, various metrics such as accuracy, precision, recall, and F1-score were measured across text and voice input data. The system's performance was also evaluated based on the efficiency of real-time feedback processing, especially in voice-based applications.

In the evaluation process, a diverse dataset comprising both text reviews and voice recordings was utilized to ensure comprehensive testing. This included various genres of movies and a range of user opinions, allowing the system to capture a wide array of sentiments related to different aspects such as plot, acting, direction, and production quality. By employing deep learning techniques and natural language processing, the system effectively extracted meaningful insights from the data, demonstrating its robustness and versatility.

The results indicate that the aspect-based sentiment analysis approach significantly improves the understanding of user preferences, providing tailored recommendations based on the nuanced feedback received. The integration of voice feedback further enriched the analysis by incorporating emotional subtleties, such as tone and prosody, which are often critical in conveying sentiment but may be lost in text-only assessments.

**Evaluation Metrics**

The model was tested using both textual and voice datasets, where each review was broken down by specific movie aspects, and sentiment predictions were made for each aspect. The results were assessed using the following metrics:

**Accuracy** – The percentage of correctly predicted sentiments out of the total predictions.

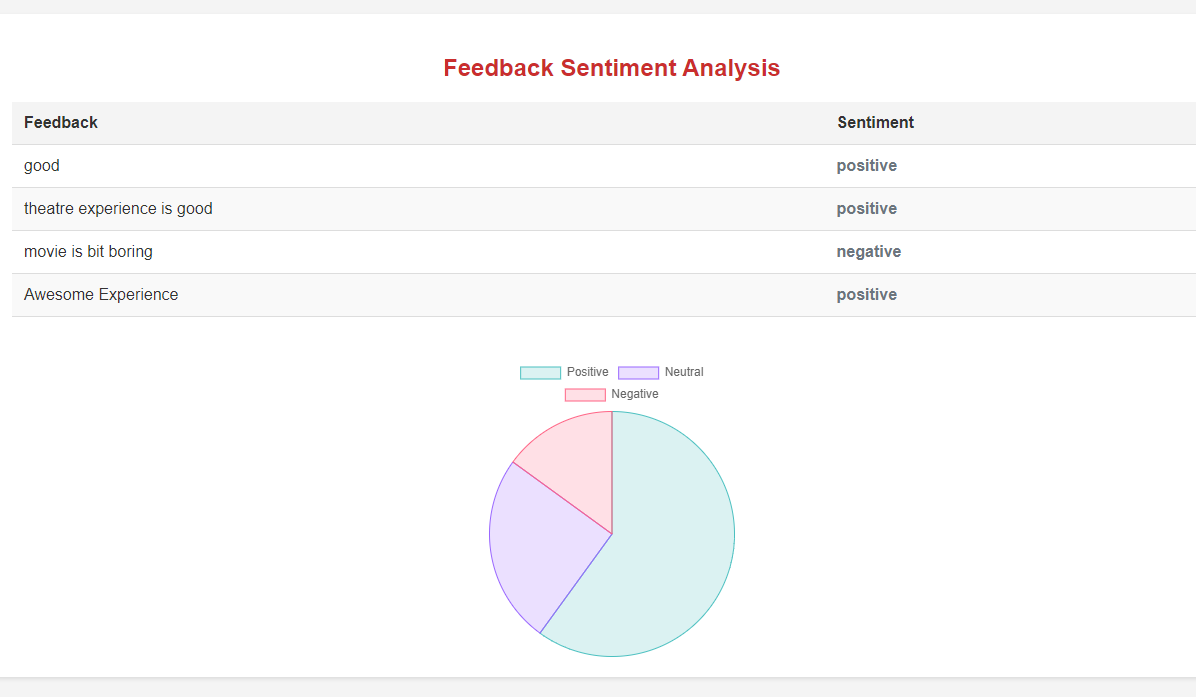
**Precision** – The ratio of correctly predicted positive sentiments to the total number of predicted positive sentiments.

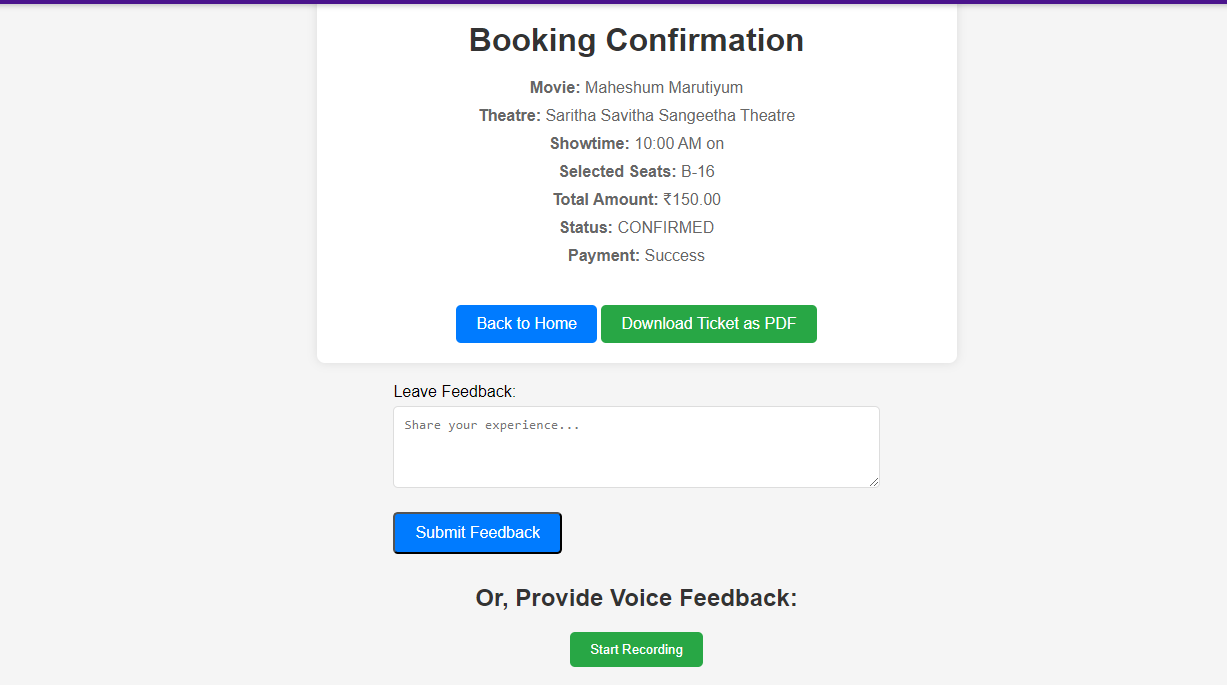
**Recall** – The ratio of correctly predicted positive sentiments to the total number of actual positive sentiments.

**F1-Score** – The harmonic mean of precision and recall, providing a balance between the two.

**Performance of Text and Voice-Based Sentiment Analysis**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Input Type** | **Accuracy (%)** | **Precision** | **Recall** | **F1-Score** | **Processing Time (ms)** |
| Text Reviews | 89.4 | 0.91 | 0.88 | 0.89 | 85 |
| Voice Feedback | 86.7 | 0.88 | 0.85 | 0.86 | 120 |
| Combined (Text + Voice) | 91.2 | 0.92 | 0.90 | 0.91 | 105 |





**9. Conclusion**

The research papers collectively highlight the transformative role of voice data in enhancing aspect-based sentiment analysis (ABSA). By integrating voice feedback with traditional text-based approaches, these studies demonstrate that vocal elements such as tone, prosody, and emotional expression offer richer contextual insights, improving the accuracy and depth of sentiment analysis. Key challenges such as speech recognition accuracy and real-time processing are addressed through adaptive and multimodal frameworks, enabling more dynamic and responsive applications, particularly in areas like customer service, e-commerce, and virtual assistants.

The findings suggest that leveraging the unique characteristics of spoken language—through prosody, tone, and other vocal cues—enables a more fine-grained and nuanced understanding of user sentiments. This holistic approach not only improves the precision of aspect recognition but also opens up opportunities for more personalized and context-aware interactions in various domains. Ultimately, integrating voice data into ABSA frameworks holds great potential for advancing user experience, business intelligence, and customer satisfaction by offering deeper, more comprehensive sentiment insights.

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