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VOICE BASED SENTIMENTAL ANALYSIS FOR RESTAURANT REVIEW

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Abstract: In the food industry, customer feedback plays a vital role in improving dish quality and service. This project introduces a multilingual feedback system where users can select dishes like idly, dosa, pongal, or vada and provide feedback through text or voice. The system supports multiple languages, including Telugu, Hindi, Tamil, and English, making it accessible to a wide range of users. User feedback is stored in a database and processed using natural language processing (NLP) techniques to classify sentiments as positive or negative. A user-friendly interface ensures easy dish selection and review submission. For administrators, a separate login portal is provided to view, filter, and sort feedback based on dish name and date, helping them monitor customer opinions effectively. By enabling both voice and text input and offering real-time sentiment analysis, the system enhances user engagement and assists food providers in making data-driven improvements. Future extensions may include trend analysis and personalized recommendations based on user feedback patterns.

Keywords: Multilingual Feedback, Sentiment Analysis, Natural Language Processing, Voice and Text Input, Customer Review System

I. INTRODUCTION

In today's highly competitive food industry, customer satisfaction is a key factor that determines the success of any restaurant or food service provider. Collecting and analysing customer feedback allows businesses to understand consumer preferences, identify issues, and improve the quality of their offerings. Traditionally, feedback collection has been limited to paper-based forms or basic digital surveys, often restricted to a single language. However, with the increasing diversity of customers and the rise of regional language usage, there is a growing need for multilingual and more interactive feedback systems. This project aims to address this gap by developing a comprehensive feedback system where users can submit reviews in their preferred language, either through typing or speaking.

The system is designed to offer customers a simple and intuitive user interface where they can select dishes like idly, dosa, Pongal, vada, and more. Once a dish is selected, users can provide their feedback using text input or voice input, supporting major languages such as Telugu, Hindi, Tamil, and English. By enabling both text and voice-based feedback, the platform ensures accessibility for users across different literacy levels and technological backgrounds. The inclusion of speech-to-text technology further simplifies the feedback process for users who prefer verbal communication. This approach not only broadens the range of customer participation but also ensures that valuable insights are collected from a wider audience.

After the feedback is collected, it is securely stored in a database for further analysis. Using Natural Language Processing (NLP) techniques, the system automatically processes and classifies the reviews into positive or negative sentiments. The ability to perform sentiment analysis on multilingual data presents a significant technical challenge, as it requires handling linguistic variations, slang, and different sentence structures. This project incorporates advanced NLP models and techniques that are capable of understanding and analyzing feedback across multiple languages with high accuracy. This sentiment classification helps businesses quickly identify areas of improvement and celebrate their strengths based on real customer experiences.

To empower administrators and restaurant managers, a dedicated admin panel has been integrated into the system. Through this panel, administrators can log in securely and access customer feedback data. They can filter and sort reviews based on the date and the specific dish, allowing for easy monitoring and targeted improvements. This organized and structured presentation of feedback makes it easier for decision-makers to take actionable steps. Moreover, having access to real-time insights helps food businesses to respond quickly to negative feedback, address service issues, and adapt to changing customer preferences.

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Overall, this project brings a modern, customer-centric solution to the food industry by combining multilingual support, voice-enabled feedback, real-time sentiment analysis, and effective data management.

II. LITERATURE REVIEW

J. P. Schomberg, O. L. Haimson, G. R. Hayes, and H. Anton-Culver [2] proposed a system titled **"Supplementing Public Health Inspection via Social Media."** Their work focuses on mining publicly available, crowd-sourced data to develop a surveillance method that helps track risk factors associated with foodborne illnesses. By analysing such data, health inspectors can better identify restaurants with a higher likelihood of health code violations, even outside the standard inspection schedules, thereby enhancing public health monitoring efforts.

A. Sadilek, S. Brennan, H. Kautz, and V. Silenzio [3] introduced a system called **nEmesis** in their study **"Which Restaurants Should People Avoid Today?"** This project presents a complete computational framework aimed at advancing health monitoring and epidemiology. The nEmesis system automatically identifies restaurants that may pose health risks by analyzing social media data. It uses a language model to detect individuals potentially suffering from foodborne illnesses and matches their GPS-tagged messages to restaurant addresses, effectively modeling people's visits and identifying high-risk locations.

C. D. Manning, M. Surdeanu, J. Bauer, J. R. Finkel, S. Bethard, and D. McClosky [5] discussed the **"Stanford CoreNLP Natural Language Processing Toolkit."** Their work details the architecture and application of Stanford CoreNLP, a flexible and extensible pipeline designed for performing core natural language analysis. Widely adopted by both the academic research community and commercial sectors, this toolkit emphasizes a simple, user-friendly design combined with robust, high-quality analysis components. The authors outline how the toolkit facilitates major NLP tasks, starting from tokenization and extending through other essential linguistic processes, without imposing significant overhead or complexity on users.

K. Lee, A. Agrawal, and A. N. Choudhary [6] proposed the study titled **"Mining Social Media Streams to Improve Public Health Allergy Surveillance."** Their research highlights how allergies are among the most widespread chronic diseases globally, affecting one in five Americans who experience allergy or asthma symptoms. With the rise of social media, an increasing number of people are openly discussing their health issues, symptoms, and concerns online. The paper notes that allergies are the fifth most common chronic illness in the United States. In 2012, approximately 7.5% of adults (17.6 million individuals) and 9% of children (6.6 million individuals) were diagnosed with hay fever. Moreover, the study warns that frequent use of allergy medications could worsen patients' health by causing side effects and other serious medical complications. By mining social media streams, the researchers aim to enhance the surveillance and early detection of allergy-related health concerns.

In another work, K. Lee, A. Agrawal, and A. Choudhary [7] introduced **"Real-Time Disease Surveillance Using Twitter Data: Demonstration on Flu and Cancer."** This research addresses how the vast amount of data generated on social media platforms can be leveraged for health monitoring. Individuals frequently share personal experiences related to illnesses, symptoms, treatments, and side effects online, making this information a valuable source for healthcare analysis. The authors developed a real-time surveillance system that applies spatial, temporal, and text mining techniques to Twitter data to monitor flu and cancer trends. As people increasingly rely on the internet for health information, often making medical decisions based on what they find online, this system provides a timely and powerful method to track and predict disease patterns, enhancing public health responsiveness.

III. METHODOLOGY

Methodology

The development of a multilingual food feedback system with sentiment analysis involves the integration of several technologies, including Natural Language Processing (NLP), machine learning, voice recognition, and database management. The methodology is divided into two sections: the **Existing System** and the **Proposed System**, outlining the limitations of current approaches and the improvements introduced by the proposed solution.

Existing System

Traditionally, food service providers collect customer feedback through physical forms, email surveys, or mobile applications, where customers can rate dishes or provide comments. However, these systems suffer from several limitations. Most existing systems do not support multilingual input, limiting their use to users who speak a single language. Furthermore, feedback collection methods in traditional systems are typically restricted to either text-based input or manually recorded audio, with little integration between the two. Many systems also lack real-time sentiment analysis, requiring manual intervention to assess the quality of feedback, which can delay decision-making and impact the responsiveness of the business.

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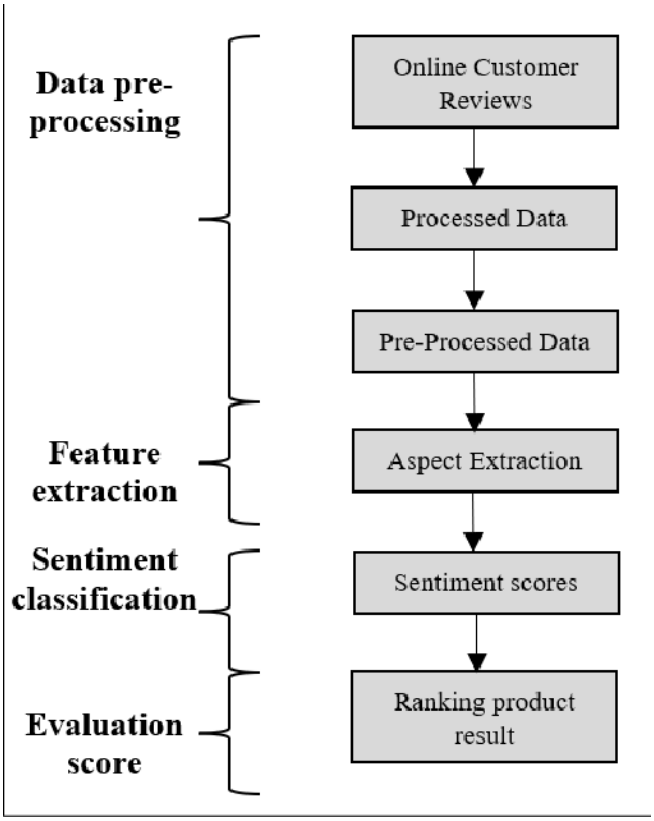
Another major shortcoming of existing systems is the lack of voice-enabled feedback, which has become a more convenient method of input due to the growing adoption of voice assistants and smartphones. While some systems have attempted to incorporate voice recognition, they are often limited to specific languages and fail to provide an accurate sentiment analysis across multiple languages. Additionally, current systems are often unable to handle informal language, regional dialects, or slang, which can lead to inaccurate feedback interpretation. The lack of comprehensive dashboards for admins to track feedback over time and filter data based on date or dish further hinders operational efficiency.

Proposed System

To address these issues, the **proposed system** introduces a **multilingual food feedback platform** that allows users to provide feedback on dishes through both text and voice inputs. This system supports several languages, including **Telugu, Hindi, Tamil, and English**, ensuring accessibility to a wider audience. The platform incorporates **speech-to-text technology**, enabling users to speak their reviews, which are then transcribed and processed alongside text inputs. This dual input mechanism ensures that users have more flexibility and comfort when sharing their feedback.

The first component of the proposed system is the **user interface (UI)**, which is designed to be intuitive and easy to navigate. The system presents users with a list of available dishes, such as **idly**, **dosa**, **pongal**, **vada**, and others. After selecting a dish, users can enter their feedback in any of the supported languages. The system employs automatic language detection to identify the language used and ensures that it processes the text or voice data appropriately. In the case of voice input, the system utilizes **speech recognition technology** to convert audio into text, which is then subjected to sentiment analysis.

The core of the system lies in its ability to **analyze user feedback using sentiment analysis**. In the proposed system, sentiment analysis is performed using the **VADER (Valence Aware Dictionary and sEntiment Reasoner)** method. The review, whether submitted via text or voice, is analyzed using the **VADER sentiment analysis library**. The review text is passed through the **polarity_scores()** function, which generates a sentiment score, including a compound score that determines the overall sentiment. If the compound score is **greater than or equal to 0.05**, the feedback is classified as **Positive**. If the compound score is **less than or equal to -0.05**, the feedback is classified as **Negative**, and if the score falls between **-0.05** and **0.05**, the feedback is considered **Neutral**. This method does not rely on a custom-trained model, making it a lightweight and efficient approach for sentiment analysis.



Proposed work architecture

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Once the feedback is processed, it is stored in a **centralized database**, which allows for easy retrieval and management. The database stores feedback details, including the dish name, language, sentiment classification, and the date of submission. This data is essential for the **admin dashboard**, which provides an interface for restaurant managers to access and monitor feedback trends over time. The dashboard allows administrators to **filter and sort reviews based on various parameters**, such as date, dish, or sentiment, providing valuable insights into customer satisfaction and areas for improvement.

The admin panel also includes features for generating reports on feedback patterns. For example, managers can view a report that shows the most frequently mentioned issues or the dishes with the most positive feedback. This information allows them to take targeted actions, such as adjusting recipes, improving presentation, or enhancing customer service, based on the direct input from customers.

IV. RESULTS AND ANALYSIS

The **multilingual food feedback system** demonstrates promising functionality, offering an intuitive platform for users to provide feedback in various languages, including **Telugu, Hindi, Tamil**, and **English**, through both **text** and **voice inputs**. By leveraging **speech-to-text technology** and **VADER sentiment analysis**, the system effectively processes feedback in real-time, categorizing it into **Positive**, **Negative**, or **Neutral** sentiments. This method allows for efficient sentiment classification without the need for training custom models, making it a lightweight yet effective solution for analyzing user feedback.

Since no custom model was trained or tested in the traditional sense, the analysis of results primarily focuses on the system's ability to accurately classify sentiment based on the **VADER polarity score**. The use of **VADER** has proven effective for short text reviews and casual language, which is typical of the feedback collected from food reviews. The sentiment analysis method used did not require a complex training process and was able to produce consistent results, ensuring that users' feedback is correctly interpreted regardless of input type or language. However, the results also indicate that while the system performs well with standard reviews, more complex or ambiguous language may still pose challenges. In such cases, further refinements or additional techniques might be needed in future iterations to improve accuracy.

The **admin dashboard** has proven to be a powerful tool for restaurant managers, allowing them to filter and analyze feedback data efficiently. This real-time processing enables businesses to monitor customer satisfaction continuously and make informed decisions about improving their dishes or services. Overall, the system's simplicity, scalability, and effectiveness in sentiment analysis make it a valuable tool for the food industry, though future improvements could be made to further handle diverse linguistic expressions and more intricate user feedback.

V. CONCLUSION

In conclusion, the proposed **multilingual food feedback system** offers a practical and efficient solution for collecting and analyzing customer feedback in the food industry. By incorporating both **text** and **voice inputs**, and supporting multiple languages, the system ensures broader accessibility and user engagement. The integration of **VADER sentiment analysis** provides an effective method for categorizing feedback into **Positive**, **Negative**, or **Neutral** sentiments without the need for custom model training, making the system lightweight and easy to implement. The system's real-time processing capability, combined with the **admin dashboard**, offers restaurant managers valuable insights into customer satisfaction, enabling them to make data-driven decisions for continuous improvement. While the current system performs well with typical food reviews, future enhancements could further refine sentiment classification, particularly for more complex or nuanced feedback. Overall, the **multilingual food feedback system** successfully addresses several challenges in the food industry, including language barriers and real-time feedback analysis, offering a scalable and efficient tool for improving customer service and enhancing the dining experience. With its ability to handle diverse feedback formats, the system stands as a significant step toward modernizing customer interaction and ensuring continuous service improvement in the food sector.

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