Vivekanand Education Society's Institute of Technology

Department of Computer Engineering

Group No.: 41

Date : August 04, 2024

Project Synopsis(2024-25) Sem VII

"SmartServe"- AI Solutions for Restaurant Management and Customer Engagement

Mrs. Yugchhaya Galphat

Assistant Professor , Department of Computer Engineering

Ruchir Jain	Vishakha Mangtani	Ketan Paryani
V.E.S.I.T	V.E.S.I.T	V.E.S.I.T
2021.ruchir.jain@ves.ac.in	2021.vishakha.mangtani@ves.ac.in	2021.ketan.paryani@ves.ac.in

INDEX

LIST OF FIGURES

Abstract

The Feedback System for Restaurant Owners aims to enhance customer engagement and improve service quality by providing a centralized portal for food ordering and feedback management. This innovative system allows customers to place orders for varying quantities, send inquiries to multiple restaurant owners, receive quotations, and negotiate orders. A comprehensive feedback mechanism is integrated, enabling customers to submit qualitative and quantitative reviews through QR code-based forms. These reviews are analyzed using advanced algorithms to generate actionable insights. The system also features a loyalty points program to reward frequent and positive reviewers, fostering customer loyalty. Additionally, an AI-powered chatbot, trained on existing reviews and feedback, assists customers in selecting restaurants and dishes, thereby improving their overall experience. By addressing the current inefficiencies in feedback collection and order management, this project aims to create a more responsive and customer-centric restaurant industry. The implementation of this system has the potential to significantly enhance customer satisfaction and operational efficiency for restaurant owners.

Introduction

In India, the food service market was valued at $56 billion in 2021 and is projected to grow at a CAGR of 9% through 2025. Despite this growth, the industry faces numerous challenges, including high competition, fluctuating customer preferences, and the need for continuous innovation to attract and retain customers.

In the highly competitive restaurant industry, customer feedback is paramount to maintaining and improving service quality. Traditional feedback methods, such as comment cards or manual surveys, often fail to capture the detailed insights necessary for making informed decisions. Moreover, these methods lack the immediacy and convenience that modern customers expect. The rise of digital technology presents an opportunity to transform how restaurants gather and utilize customer feedback. By leveraging a centralized portal that integrates food ordering with a robust feedback mechanism, restaurants can streamline operations, enhance customer satisfaction, and foster loyalty. The proposed system not only simplifies the process of ordering food but also provides a comprehensive platform for capturing and analyzing customer reviews.

Customer feedback plays a crucial role in navigating these challenges. According to a 2020 survey by Deloitte, 60% of restaurant patrons in the United States indicated that online reviews and ratings significantly influence their dining choices. Moreover, a study by BrightLocal found that 87% of consumers read online reviews for local businesses, including restaurants, before making a purchase decision. This underscores the importance of having an effective feedback system in place. By integrating advanced feedback mechanisms and leveraging data analytics, restaurants can gain valuable insights into customer preferences, improve service quality, and ultimately enhance their competitive edge in the market. For example, implementing a digital feedback system can increase customer engagement and satisfaction by providing a seamless and immediate way for customers to share their dining experiences.

For instance, consider a scenario where a customer wants to order food for a large family gathering. Using the centralized portal, the customer can browse various restaurant options, place an inquiry, and receive quotations from multiple restaurants. After making a selection and enjoying the meal, the customer can scan a QR code on their bill to provide detailed feedback about their experience. This feedback, categorized into qualitative and quantitative aspects, is then analyzed to generate actionable insights for the restaurant. In addition, the system rewards the customer with loyalty points for their participation, encouraging future engagement. An AI-powered chatbot, trained on aggregated reviews, can assist new customers by recommending restaurants and dishes based on past feedback, thus enhancing the overall dining experience. This integrated approach not only improves operational efficiency for restaurant owners but also ensures a seamless and satisfying experience for customers.

Problem Statement

The restaurant industry, a cornerstone of global commerce, is plagued by inefficiencies in customer feedback collection and food ordering processes. Traditional methods of gathering feedback, such as paper comment cards and manual surveys, are outdated and often fail to provide actionable insights that can drive meaningful improvements. These methods are typically cumbersome, time-consuming, and inconvenient for customers, resulting in low participation rates and skewed data. Furthermore, the lack of real-time feedback mechanisms prevents restaurant owners from promptly addressing issues, potentially leading to decreased customer satisfaction and loyalty.

Additionally, current food ordering systems do not fully cater to the diverse needs of customers, especially for events requiring large quantities of food. The process of obtaining quotations, negotiating prices, and managing orders for such events is often inefficient and fragmented, leading to potential miscommunications and unsatisfactory customer experiences. Customers face challenges in comparing options and making informed decisions, while restaurant owners struggle with managing inquiries and providing timely responses.

This disconnect between customers and restaurant owners hinders the ability of restaurants to adapt to changing customer preferences and improve their services. Despite the availability of advanced technologies, many restaurant owners are not leveraging them to their full potential, resulting in missed opportunities for enhancing customer engagement and operational efficiency. The absence of an integrated system that combines efficient food ordering with a robust feedback mechanism further exacerbates these issues.

Addressing these challenges requires a comprehensive solution that streamlines the food ordering process, facilitates effective communication between customers and restaurant owners, and provides a sophisticated feedback mechanism that captures both qualitative and quantitative data. Such a system must be user-friendly, accessible, and capable of generating actionable insights that can drive continuous improvement. The need for innovation in this space is critical to ensuring the long-term success and sustainability of the restaurant industry in an increasingly competitive market.

Proposed Solution

The proposed solution aims to create a comprehensive Feedback System for Restaurant Owners by addressing the inefficiencies in current food ordering and feedback collection methods. This integrated platform streamlines food ordering and delivery management while incorporating an AI-powered chatbot to assist with personalized recommendations. Customers can place orders seamlessly, track deliveries, and provide detailed feedback through a QR code on their bill. The system analyzes this feedback to generate actionable insights, enhancing operational efficiency and customer satisfaction while fostering loyalty and improving the overall dining experience.. The system integrates several key features to enhance the overall customer experience and provide valuable insights to restaurant owners.

Basic Necessary Features

Centralized Portal for Restaurants:

- The system will feature a centralized portal where all participating restaurants can be accessed by customers.
- Customers can place orders for food on a small scale (individual meals) or large scale (bulk orders for events).

Order Enquiry and Quotation System:

- Customers can send inquiries directly to restaurant owners and request replies and quotations for their orders.
- For new customers or those seeking multiple options, an uploaded query will be sent to all relevant restaurant owners. This allows customers to receive various quotations and negotiate terms before booking orders.

Important Feedback Mechanism

QR Code-Based Feedback:

- Upon order completion, customers will receive a bill that includes a QR code. Scanning this code will open a feedback form for the customer to submit their reviews.
- The feedback form will include two key aspects:
  - **Qualitative Feedback**: Customers can provide detailed comments about their experience.
  - **Quantitative Feedback**: Customers can rate their experience on a numerical scale.

Categorization and Analysis:

- Feedback will be categorized as either good or bad.
- An algorithm will be implemented to assign weightage to the feedback, ensuring that it is appropriately analyzed for actionable insights.

Loyalty Points System

Rewarding Loyal Customers:

- Restaurants will have the option to mark customers as loyal based on their feedback and engagement.
- Loyal customers, who consistently provide good reviews and feedback, will be rewarded with loyalty points, encouraging repeat business and fostering customer loyalty.

AI Chatbot

Enhanced Customer Support:

- An AI-powered chatbot will be trained on the reviews and feedback collected from customers.
- The chatbot will assist customers in selecting suitable dishes and restaurants based on their preferences and past feedback, enhancing their overall dining experience

Methodology / Block Diagram

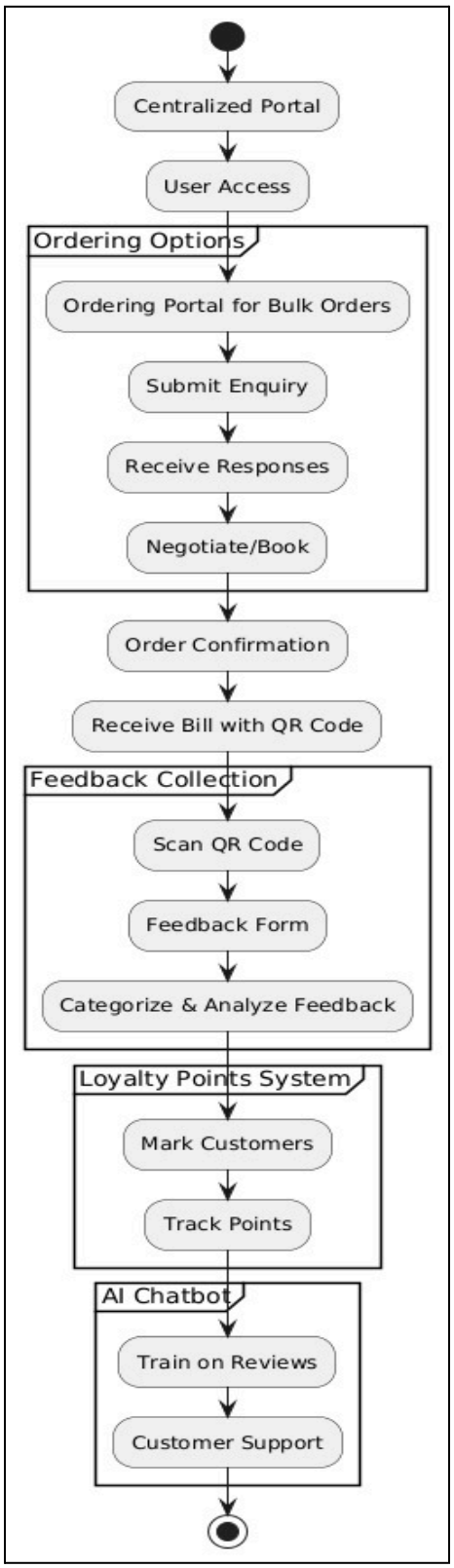

Fig 1 Methodology block diagram

Hardware, Software, and Tools Requirements

Hardware:

- Windows Laptop
- 16GB RAM and 512 SSD

Software:

Frontend:

- React
- Angular
- AgCharts
- Flutter for Mobile Application

Backend:

- Spring Boot
- Express
- NodeJS
- MSSQL Database

Tools:

- VS Code
- IntelliJ IDE
- Github

Proposed Evaluation Measures

1. Response Accuracy: Measures how accurately the chatbot provides relevant and correct responses to user queries.
Accuracy Rate: Percentage of correct responses out of total interactions.

2.Response Time: Measures the time taken by the chatbot to respond to user queries.
Average Response Time: The average time taken to respond to user queries.

3.User Satisfaction: Measures how satisfied users are with the chatbot interactions.
Customer Satisfaction Score (CSAT): Users rate their satisfaction with the chatbot on a scale.

4.Resolution Rate; Measures the chatbot's ability to resolve user queries without human intervention.
First Contact Resolution (FCR): Percentage of queries resolved in the first interaction.

5.Page Load Time: Measures the average time it takes for a web page to fully load.
Metric: Average Load Time in seconds.

6.Bounce Rate: Percentage of visitors who navigate away from the site after viewing only one page.
Metric: Bounce Rate percentage.

7.Conversion Rate: Percentage of visitors who complete a desired action
Metric: Conversion Rate percentage.

8.User Engagement: Measures how users interact with the website, such as the time spent on the site and the number of pages visited per session.
Metric: Average Session Duration and Pages per Session.

Conclusion

The implementation of a comprehensive feedback system for restaurant owners brings numerous advantages, streamlining order management and enhancing customer engagement. The centralized portal allows customers to easily place both individual and group orders, while the enquiry and quotation system provides flexibility and choice. This system not only improves communication between customers and restaurant owners but also facilitates better service and satisfaction by catering to diverse needs.

The QR code feedback mechanism ensures prompt collection of customer feedback, leading to valuable insights for continuous improvement. By categorizing and analyzing qualitative and quantitative feedback, restaurants can make data-driven decisions to enhance their offerings. The loyalty points system rewards repeat customers, fostering customer retention, and the AI chatbot provides personalized assistance, leveraging feedback data to enhance the customer experience. Overall, this integrated approach not only elevates customer satisfaction but also drives operational efficiency and business growth for restaurant owners.

References

[1]T. Raibagi, A. Vishwakarma, J. Naik, R. Chaudhari and G. Kalme, "Orderista - AI-based Food Ordering Application," 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS), Coimbatore, India, 2021, pp. 34-37, doi: 10.1109/ICAIS50930.2021.9396040.

[2]Hoojin Lee and E. J. Powers, "QR-decomposition-based linear and decision-feedback detections for D-STTD systems over time-selective fading channels," GLOBECOM '05. IEEE Global Telecommunications Conference, 2005., St. Louis, MO, USA, 2005, pp. 5 pp.-2301, doi: 10.1109/GLOCOM.2005.1578073. .

[3]Nikola Vuksanovic,Dunja Demirović Bajrami,Marko D. Petrović, ”QR codes as a tool for receiving feedback about guests’ satisfaction at destinations” Journal of Place Management and Development ahead-of-print,August 2020.

[4]C. -E. Domokos, B. Séra, K. Simon, L. Kovács and T. -B. Szakács, "Netfood: A Software System for Food Ordering and Delivery," 2018 IEEE 16th International Symposium on Intelligent Systems and Informatics (SISY), Subotica, Serbia, 2018, pp. 000143-000148, doi: 10.1109/SISY.2018.8524854.

[5]T. Raibagi, A. Vishwakarma, J. Naik, R. Chaudhari and G. Kalme, "Orderista - AI-based Food Ordering Application," 2021 International Conference on Artificial Intelligence and Smart Systems (ICAIS), Coimbatore, India, 2021, pp. 34-37, doi: 10.1109/ICAIS50930.2021.9396040.

[6]R. Garg et al., "NLP Based Chatbot for Multiple Restaurants," 2021 10th International Conference on System Modeling & Advancement in Research Trends (SMART), MORADABAD, India, 2021, pp. 439-443, doi: 10.1109/SMART52563.2021.9676218.

[7]S. -H. Wu, J. Hsiao, Y. -S. Wu and J. -T. Jeng, "AI Food Recommendation Systems," 2022 IET International Conference on Engineering Technologies and Applications (IET-ICETA), Changhua, Taiwan, 2022, pp. 1-2, doi: 10.1109/IET-ICETA56553.2022.9971598.

[8]M. R. Ardiansyah, J. F. Kusuma, I. S. Gumelar and M. Mentari, "The Website-Based Food Booking System Equipped with Real-Time Booking Status to Address Queuing Issues at Restaurants," 2021 International Conference on Electrical and Information Technology (IEIT), Malang, Indonesia, 2021, pp. 133-138, doi: 10.1109/IEIT53149.2021.9587443

[9]Ahmed Alkhayyat,Raman Kumar,Sandeep Singh”An Online QR Code Scanner for Real-Time User Feedback and Ratings Collection with Local Web Server ”2024 11th International Conference on Computing for Sustainable Global Development (INDIACom).