Concept Paper

Developing a Business Intelligence for Leaftea Milktea Bar Integrated with DialoGPT-powered Chatbots

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Abstract

Purpose – This project aims to digitally transform Leaftea Milktea Bar by developing an advanced AI-driven business intelligence system integrated with Dialogpt-powered chatbots. The goal is to significantly enhance customer engagement, streamline and automate operational processes, and elevate service efficiency to unprecedented levels. The system will be developed using Python, HTML, CSS, JavaScript, and MySQL.

Proposed Method – The study uses a hybrid approach, combining quantitative analytics and qualitative evaluations. Customer surveys will measure satisfaction and engagement before and after chatbot implementation, while staff interviews will assess operational impacts. The Dialogpt will be seamlessly integrated into LeafTea's infrastructure. Advanced statistical tools and thematic analysis will be employed to derive insights. This research aims to provide actionable recommendations for leveraging AI technologies to optimize business operations in the food and beverage industry.

Conclusion – Implementing DialoGPT-powered chatbots for business intelligence significantly boosts customer engagement and operational efficiency. By leveraging data analytics and AI-driven interactions, this solution enhances personalization and provides real-time insights, transforming the food and beverage industry. It enables businesses like LeafTea MilkTea Bar to serve customers better and streamline operations, promoting sustainable growth.

Initial Results – Initial prototype designs demonstrate some of the system's functionality. First is the dashboard which shows the summarization of the branches' flow and growth. Second is the chatbot designed to assist users specifically for order taking. Lastly, the inventory shows the available stocks. Also, the orders that have been placed in the chatbot will be automatically deducted from the warehouse inventory.

Recommendation – This study recommends adopting the proposed system in merchandising and manufacturing businesses to optimize stock levels, facilitate real-time updates, and ensure scalability to meet evolving business demands.

Practical Implications – The system's benefits extend beyond businesses, encompassing students, prospective researchers, and developers.

Keywords – AI, Artificial Intelligence, Business intelligence, Chatbot, DialoGPT, Embeddings

INTRODUCTION

In recent years, more people have pursued business ventures to gain independence, increase their income, and have more time with their families. Starting a business requires substantial time and effort, and efficient inventory management is crucial to success. Without proper inventory management, businesses are vulnerable to theft, damage, and sales depletion.

Inventory management involves managing the flow of stocks from ordered to available to sold. Modern technology has enabled many business owners, especially those in large companies, to use systems for inventory management. This is particularly important for businesses dealing with perishable food products that require frequent monitoring.

This project aims to help warehouse and branch owners track stock levels and ensure transparency in stock flow. A key feature is the integration of DialoGPT-powered chatbots to assist branch owners in inquiring about available stocks and placing orders outside of warehouse managers' working hours. This system will enhance the performance of maintaining stock flow and prevent resource and space waste by controlling the accumulation of dead stock.

Additionally, the importance of chatbots in business operations is significant. Chatbots can provide instant responses, improve customer engagement, and operate 24/7, which is especially beneficial for businesses needing constant inventory monitoring and management.

LITERATURE REVIEW

Miklosik et al. (2024) conducted a systematic literature review on the use of chatbots in digital business transformation. They emphasized the significant impact of chatbots in improving communication between organizations and their customers, as well as internal team interactions. Their research underscores the importance of AI-driven chatbots, which become more effective with increased data and user interactions, in facilitating digital transformation across various industries. The study included an analysis of 74 high-quality journal articles, focusing on the topical, methodological, and bibliometric aspects of chatbot research. This extensive review offers valuable insights for scholars and practitioners, helping them identify key topics, established and emerging methodologies, influential publications, and suitable publication outlets in the field of chatbots.

Panigrahi et al. (2023) examined the adoption of AI chatbots (AICs) to enhance sustainable manufacturing supply chain (SC) performance in SMEs. They highlighted the significant role of AICs in improving supply chain visibility (SCV) and innovation capability (IC), which are essential for achieving sustainable supply chain performance (SSCP). Using structural equation modeling (SEM) based on 246 survey responses, the study demonstrated that AICs positively impact SCV and IC, thereby supporting SSCP. Additionally, SCV and IC were found to partially mediate the relationship between AIC adoption and SSCP. The research underscores the potential of AICs to drive sustainability and innovation in manufacturing supply chains.

Skórnóg and Kmiecik (2023) upported Inventory Management in the Manufacturing Company by ChatGPT. They highlighted the importance of precise demand forecasting for effective decision-making in business operations. Accurate forecasting not only meets customer needs but also optimizes resource allocation and reduces operational costs, enhancing competitiveness. The study compared the effectiveness of demand forecasting using the GPT language model with the auto-ARIMA algorithm.

Aprosta (2024) investigated the applications of artificial intelligence in marketing strategies for fast food businesses. The study highlighted AI's significant role in enhancing customer engagement, personalizing marketing efforts, and improving operational efficiency. Specifically, AI-driven chatbots, like those powered by DialoGPT, were found to handle customer inquiries, provide recommendations, and streamline order processes effectively. This research demonstrates the importance of integrating AI technologies in business models to facilitate digital transformation, improve customer

satisfaction, and gain a competitive edge in the market. The study offers valuable insights into the strategic implementation of AI in business.

According to Clutch Editorial Team (2024), several Filipino companies have integrated chatbots into their operations with significant success. For instance, Nuxify Inc. in Davao City and White Widget in Quezon City offers advanced chatbots and conversational AI solutions. These companies highlight chatbots' increasing adoption and effectiveness in improving customer interaction, automating services, and enhancing business processes. Additionally, Twala, a digitalization service provider, has been involved in promoting digital transformation among cooperatives and housing developers in the Philippines. Their efforts include digitizing documentation processes, which align with the broader goal of enhancing operational efficiency through technology (Twala, 2024). Integrating DialogPT-powered chatbots in business models like LeafTea Milktea Bar can similarly improve customer service and operational workflows.

Holdsworth, J. (2024) explored the transformative potential of AI chatbots in enhancing customer service and operational efficiency. The study highlights how chatbots can quickly respond to customer inquiries, provide personalized service recommendations, and operate across various platforms like SMS, WhatsApp, Facebook Messenger, and more. By leveraging advanced language models and conversational AI technology, these chatbots automate tasks, offering benefits such as 24/7 availability, multilingual support, and self-service options. This capability reduces operational costs, improves customer engagement, and ensures consistent communication, making chatbots an asset across industries such as banking, e-commerce, healthcare, and more.

Madrazo (2023) focused on enhancing customer service with AI chatbots: Insights from the Dashcon Davao AI Event. Philippine Journal of Digital Innovations. The author highlights the transformative impact of AI chatbots on customer service, noting their advanced customization capabilities compared to traditional chatbots. AI chatbots, exemplified by ChatGPT, streamline data analysis and response generation, allowing for more efficient customer interactions and insightful data collection. At the Dashcon Davao AI Event, it was demonstrated how AI integration can enhance creative processes and marketing strategies by providing tailored responses and actionable insights. This advancement helps customer service teams focus on complex issues while AI manages routine tasks.

The reviewed literature consistently highlights the pivotal role of AI-driven chatbots in revolutionizing business practices, particularly in customer engagement and operational efficiency. Studies emphasize how integrating DialoGPT-powered chatbots into business models significantly enhances personalized customer interactions, streamlines order processes, and improves overall business performance. This body of research provides a solid foundation for the proposed development of a business-intelligent system for LeafTea MilkTea Bar, showcasing the potential for increased

customer satisfaction, operational efficiency, and competitive advantage through advanced AI technologies.

METHODOLOGY

Research Design

This study adopts a hybrid approach, integrating both quantitative and qualitative research methods to evaluate the effectiveness of an AI-driven business intelligence system, incorporating DialoGPT-powered chatbots at Leaftea Milktea Bar. The research design involves developing a detailed prototype of the system, conducting pre- and post-implementation surveys, and performing in-depth interviews with staff to assess the system's impact on customer engagement and operational efficiency.

System Development

The development of the system will leverage a robust technological framework. Python will be employed for backend processes, while HTML and CSS will be used for frontend design, and JavaScript will handle dynamic functionalities. A MySQL database will manage, and store data related to orders, inventory, and user interactions. DialoGPT will be integrated to facilitate real-time customer interactions, provide responsive answers to user queries, and assist in order management and stock inquiries.

The prototype design will feature several key components, including a customer interaction interface, a backend dashboard for staff, and integration with existing inventory management systems. Initial prototypes will be tested rigorously to ensure seamless integration with LeafTea's infrastructure and effective performance in managing customer interactions and operational tasks. Screenshots of these prototypes will illustrate the system's capabilities in real-time stock inquiries and order management.

Data Collection

The study will utilize both quantitative and qualitative data collection methods. Customer surveys will be administered before and after the implementation of the DialoGPT chatbot to measure customer satisfaction, engagement levels, and the effectiveness of the chatbot in managing inquiries and orders. Performance metrics such as chatbot interactions, order processing times, and inventory management efficiency will also be gathered and analyzed using advanced statistical tools to assess the system's impact on operational performance.

In addition, semi-structured interviews with LeafTea staff will provide qualitative insights into the chatbot system's operational impact. These interviews will explore the system's effect on workflow, ease of use, and any challenges faced. Thematic analysis will

be used to identify recurring themes and patterns. Detailed case studies will document the integration process, including any issues resolved and lessons learned during implementation.

Data Analysis

Quantitative data will be analyzed using statistical software such as SPSS, employing techniques like paired t-tests and regression analysis to evaluate changes in customer satisfaction and operational efficiency. For qualitative data, thematic analysis will be conducted on interview transcripts and case study notes to extract meaningful insights about the chatbot system's impact, coding responses, identifying key themes, and synthesizing findings to provide a comprehensive understanding of the system's effectiveness.

Implementation and Evaluation

The developed system will be deployed at LeafTea MilkTea Bar and monitored initially to assess its performance in real-world conditions. The effectiveness of the system will be evaluated based on customer feedback, staff experiences, and operational improvements. Necessary adjustments will be made to refine the system and address any identified issues, ensuring optimal performance and benefit for the business.

INITIAL RESULT

In the development of the business intelligence system for Leaftea Milktea Bar, integrated with DialoGPT-powered chatbots, initial testing, and implementation have shown significant potential in enhancing the efficiency of the previously manual system. By leveraging DialoGPT, the system is designed to better understand and satisfy customer preferences, making operations smoother and more responsive. Additionally, the business intelligence system offers graphical reports that provide users with a visual overview of the overall performance of each branch, allowing for closer monitoring and more informed decision-making.

The following screenshots highlight key functionalities that have been successfully integrated, demonstrating the system's capacity to drive operational excellence, elevate customer satisfaction, and provide valuable insights through detailed graphical reporting.
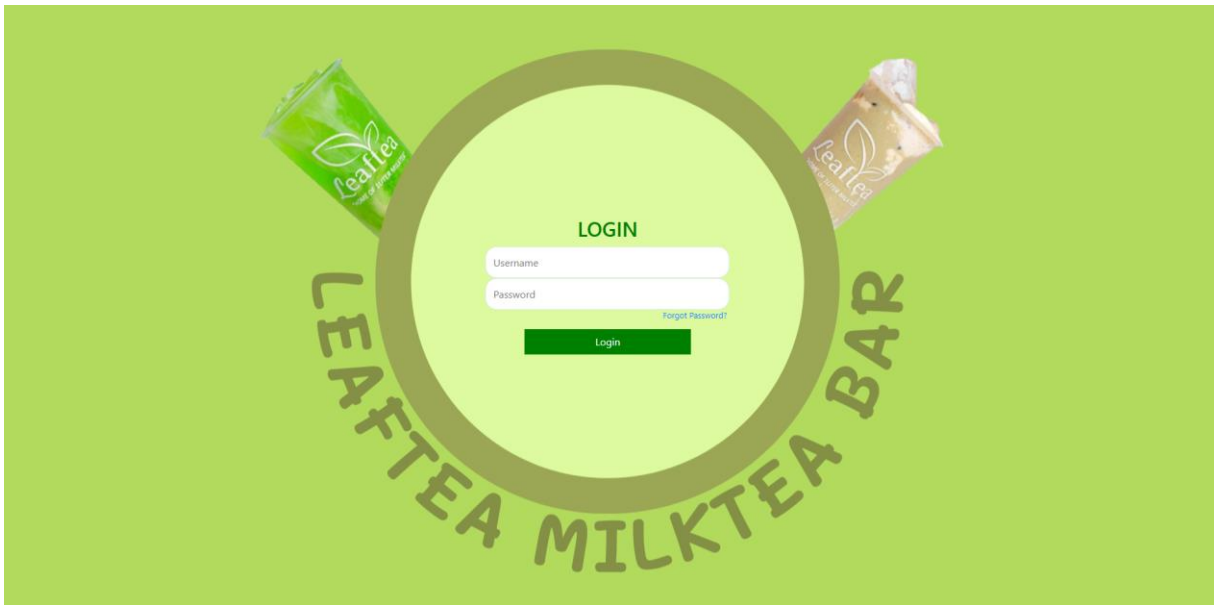
Figure 1. Login Page

Figure 1 illustrates the login page of the system. This page features a user-friendly login form that allows authorized users to access the system securely. It also includes a "Forgot Password" section, providing a convenient option for users to recover their credentials if they are unable to remember their login details. This functionality is crucial for maintaining seamless access and ensuring that users can quickly regain entry to the system when needed.
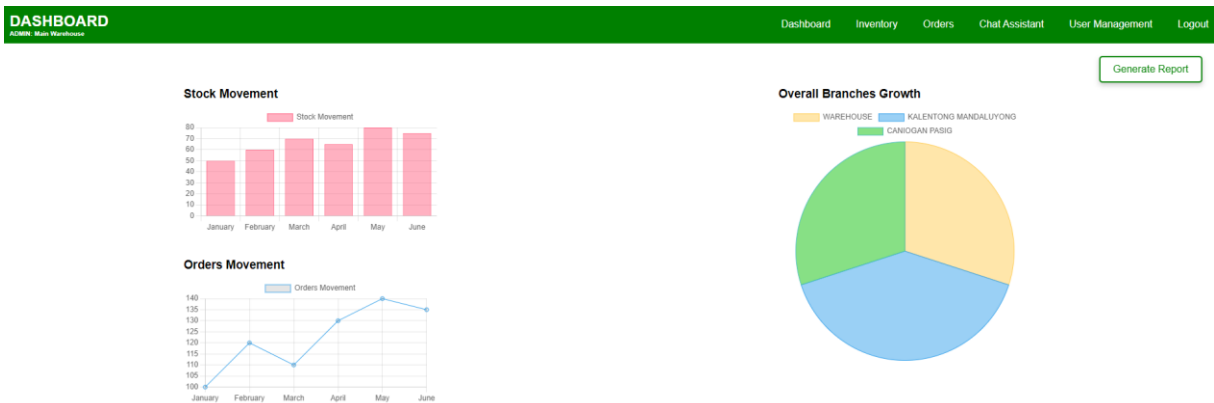

Figure 2. Dashboard Page

Figure 2 showcases the dashboard page of the system. This section displays various graphs representing the overall growth and performance of the business. The dashboard provides a comprehensive visual summary of key metrics and trends. Additionally, it features a "Generate Report" button, which, when clicked, produces a

detailed PDF graphical report. This functionality enables users to easily generate and review in-depth performance reports, supporting better analysis and strategic planning.
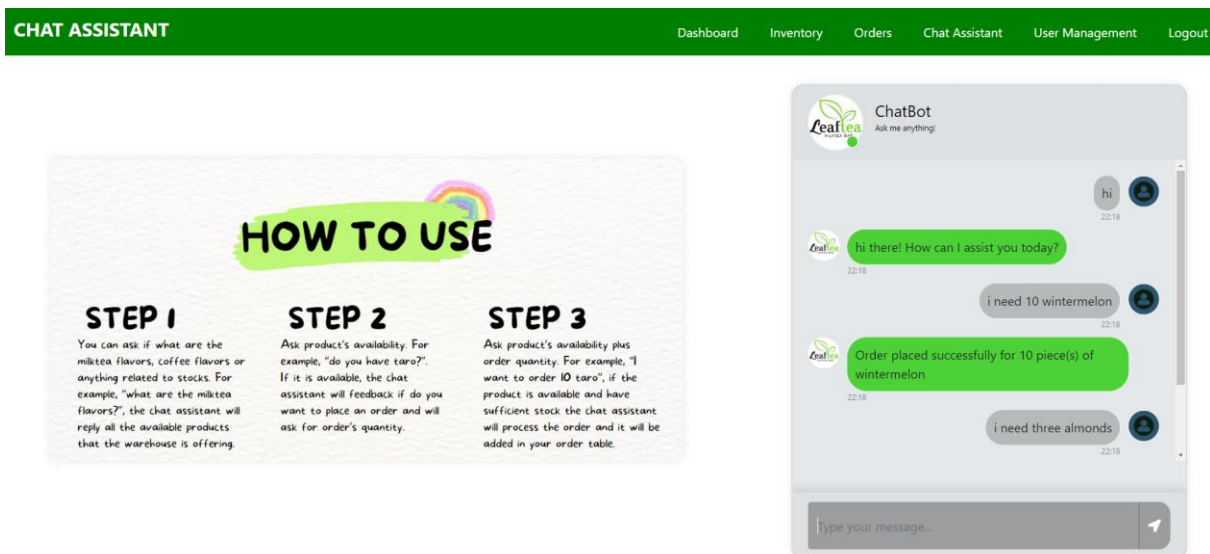

Figure 3. Chat Assistant Page

Figure 3 depicts the Chat Assistant page where DialoGPT is integrated to manage inquiries and orders between branches and the warehouse. This interface allows users to interact with the chatbot for various functions, such as inquiring about product availability in the warehouse, checking the current best sellers, and placing orders. When a stock inquiry is made, DialoGPT responds based on the current inventory in the warehouse. Upon placing an order, the system deducts the ordered items from the warehouse inventory and subsequently updates the branch's inventory to reflect the new stock levels once the order is received. This seamless integration ensures efficient inventory management and accurate tracking of stock movements.

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study underscore the pivotal role of technology, particularly inventory management systems and stock monitoring systems, in enhancing operational efficiency and productivity in businesses. By replacing manual inventory tracking methods with automated systems, businesses can streamline their operations, minimize errors, and maintain optimal stock levels. The implementation of inventory systems not only facilitates accurate tracking of stocks, supplies, and sales throughout the supply chain but also contributes to maintaining good margins and overall efficiency. Moreover, the integration of stock monitoring systems enables timely notifications between branches and warehouses, ensuring swift action to address stock shortages or surpluses. The introduction of GUI restrictions further enhances security and accountability within the organization.

Of particular significance is the incorporation of DialoGPT-powered chatbots into the system, enabling efficient communication and resolution of inquiries and concerns. The utilization of DialoGPT chatbots offers the advantage of conducting longer and more human-like conversations, thereby enhancing customer satisfaction and engagement. Additionally, the ability of DialoGPT to process and analyze larger datasets provides valuable insights for business decision-making.

Overall, the combined use of inventory management systems, stock monitoring systems, and DialoGPT-powered chatbots offers a comprehensive solution for businesses like Leaftea Milktea Bar, enabling them to streamline operations, improve customer service, and maintain a competitive edge in the market. Further research could explore the specific impacts of chatbot integration on customer satisfaction and business performance, as well as investigate additional applications of DialoGPT-powered chatbots in different industries and contexts.

Future researchers could delve into evaluating the performance of DialoGPT-powered chatbots in real-world business contexts, focusing on factors like response time and accuracy. Additionally, assessing the impact of chatbot integration on key business metrics such as sales revenue and customer retention would provide valuable insights. Exploring ways to enhance chatbot functionality, like incorporating natural language processing (NLP), could further improve the user experience. Investigating the potential for chatbot integration with other business systems beyond inventory management, such as CRM or ERP systems, would offer opportunities for streamlining communication and data exchange. Moreover, optimizing the user experience of chatbots through user testing and feedback gathering could lead to more seamless interactions. Finally, studying the long-term effects of chatbot implementation on customer behavior, employee roles, and organizational culture would provide a comprehensive understanding of their impact on businesses.

IMPLICATIONS

The proposed business intelligence system offers practical insights for businesses, particularly those in the food and beverage industry, like Leaftea Milktea Bar. By adopting advanced inventory management systems and integrating Dialogpt-powered chatbots, businesses can streamline operations and enhance customer service. These technologies enable more efficient inventory tracking, minimize errors, and optimize stock levels. Moreover, chatbots provide a convenient and responsive communication channel for handling customer inquiries and concerns. Implementing these solutions not only improves business efficiency but also fosters customer satisfaction and loyalty, giving businesses a competitive edge in the market. It's crucial for businesses to continuously evaluate and adapt these technologies to remain agile and responsive to changing market dynamics.

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DECLARATIONS
Conflict of Interest

The researcher attests to the absence of any conflicts of interest capable of exerting potential influence on the outcomes and objectives of file integrity verification within academic organizations and educational institutions. Furthermore, there are no financial or personal affiliations with individuals, organizations, or entities that could undermine the impartiality of the research.

Informed Consent

Obtaining consent from all participants engaged in the study is imperative, ensuring a comprehensive understanding of the study's purpose, procedures, potential risks, and benefits. Each participant will receive a detailed explanation of their rights and the voluntary nature of their involvement. Upholding confidentiality and anonymity throughout the study is paramount, with consent forms being secured before their participation.

Ethics Approval

The researcher acknowledges the pivotal importance of ethical research practices and vows to carry out the study with unwavering integrity, meticulously adhering to all pertinent guidelines and regulations. The researcher takes full accountability for ensuring the precision and authenticity of the information articulated within this proposal.

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