Sentimart: A Web-Based Ordering, Inventory & Feedback System using Long Short-Term Memory (LSTM) - Based Sentiment Analysis for RTEA Shop

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ABSTRACT

SENTIMART: A Web-Based Ordering, Inventory, and Feedback System based on Long Short-Term Memory (LSTM)-based Sentiment Analysis on RTEA Shop is a one-stop web-based system that was created to help manage operational drawbacks in the field of specialty tea retail. The main innovation of it is that it applies the LSTM-based sentiment analysis algorithm to customer feedback to produce predictive analysis of the feedback, used to forecast the inventory and customized advice on which products to purchase. Constructed using PHP-MySQL and evaluated as per ISO 25010 standards of Software Quality, the system proved to be very functional, reliable, user friendly and efficient. SENTIMART automates and data-driven characteristics streamline the operations, decrease the number of manual activities, and improve customer experience. According to the reviews of both technical specialists and end customers, the system has a good consensus in ISO 25010 results in assessments, which proves the effectiveness of the system as a trustworthy and convenient tool to enhance the services of RTEA Shop.

Technical respondents expressed confidence in the system's sound architecture and the precision of its LSTM sentiment analysis engine, giving it excellent grades for functionality and reliability. Although it was still given a high rating, portability scored somewhat lower, indicating a small opportunity for future improvement in terms of cross-platform consistency.

This paper Sentimart: A Web-Based Ordering, Inventory & Feedback System using Long Short-Term Memory (LSTM)-Based Sentiment Analysis for RTEA Shop" is a developmental type of technology research that aims to design, develop, and evaluate a web-based system guided by the ISO/IEC 25010 software quality model focusing on functionality, reliability, efficiency, usability, and portability. The development follows the Waterfall Model, which involves sequential phases such as requirements analysis, system design, implementation, testing, deployment, and maintenance to ensure systematic progress and quality assurance. Data collection instruments include a needs assessment survey and interview conducted before development to identify user requirements, and a Likert-scale questionnaire administered after system implementation to evaluate user satisfaction and system performance based on ISO 25010 criteria. Each phase ensures that the system meets expected behavioral standards and technical quality attributes for optimal performance. Overall, this structured approach guarantees that Sentimart delivers a reliable, efficient, and user-friendly solution adaptable to various platforms.

The study concludes that SENTIMART is a reliable, efficient, and easy-to-use solution that can improve specialized tea stores' customer-facing services as well as their operational structure. The researchers suggest additional improvements based on the evaluation results and project constraints. These include including more input channels like speech and emoji analysis, putting OTP verification into place for enhanced security, and refining the server infrastructure and LSTM model to get rid of any possible real-time processing delays under heavy traffic. Furthermore, it is recommended to conduct a continuous trial to more accurately evaluate the ystem's long-term impact on sales and customer loyalty, ensuring its scalability and sustaining success in the competitive food and beverage industry.

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Keywords: SENTIMART, LSTM, Sentiment Analysis, Web-Based System, Inventory Management, Ordering System, RTEA Shop, PHP-MySQL, SDLC, ISO 25010

INTRODUCTION

The project "Sentimart: A Web-based ordering, Inventory, & Feedback System using Long Short-Term Memory (LSTM) - Based Sentiment Analysis for RTEA Shop." addresses significant gaps in the digital integration of small and medium-sized retail businesses, particularly in the special tea industry, by utilizing long short-term memory (LSTM)-based sentiment analysis.

As Gonzalez (2020) noted, a number of milk tea stores in Nueva Vizcaya continue to utilize spreadsheets and paper-based inventory management, which frequently cause shortages of stock, surplus, and inaccurate predictions. Such inefficiencies decrease productivity and customer satisfaction, which manifests the necessity of the digital solutions, which would automatize inventory tracking and enhance the service reliability.

Ferrara (2011) stressed that the intelligent systems should also be designed with adaptive cognitive functions that could deliver appropriate responses to the varying retail environment. The Long Short-Term Memory (LSTM) models of machine learning can provide this flexibility through the interpretation of textual responses and the detection of emotional habits in customer input. The article by Hossain et al. (2020) revealed that sentiment analysis using LSTM can be highly accurate in identifying the emotional tone and intent, which may be used as an element of a customer-driven decision support system in retail and service industries.

Efficient inventory management is still one of the pillars of sustainable retail. According to Smith and Johnson (2019), the proper demand forecasting and stock replenishment reduce operational expenses and guarantee the regular supply of products. Similar findings were made by Mashayekhy, Salamat, and Kordi (2022), according to whom the use of technologies like the Internet of Things (IoT) sensors and automated monitoring of inventory can enhance the effectiveness of real-time monitoring and restocking. Reyes and Villanueva (2018) have found that inventory control has a direct positive relationship with improved financial and operational performance of MSMEs in the local context, and that structured digital systems are essential in business sustainability.

The other crucial element of competitiveness in the beverage sector is customer experience (CX). Lemon and Verhoeff (2016) claimed that the improvement of CX leads to a stronger customer loyalty with the help of personalized and consistent service interactions. Tolentino (2022) has also found that quality of products, effective service and online interaction are major factors that determine consumer satisfaction and brand loyalty among the milk tea customers in Taguig City. To this end, Elnagar, Khalifa, and Einea (2020) confirmed that hybrid artificial intelligence models, which are CNN and RNN architectures, are more accurate in sentiment classification, thus enabling the systems to identify the emotions in the customer feedback.

The COVID19 pandemic boosted the transition to digital forms meaning that small businesses had to adjust online systems to survive. According to Jribi et al. (2020), digital ordering and delivery platforms proved to be the necessary means of continuity and fulfilling ever-changing customer expectations. This change highlights the increasing need of technology integration, which facilitates operational efficiency as well as customer-centric flexibility.

The goal of this project is to develop and deploy an intelligent web-based system for RTEA that gathers customer input, uses deep learning to analyze feelings, and automates ordering and inventory procedures. By making product recommendations based on emotional indicators gleaned from client feedback, the platform will improve service personalization and provide real-time operational insights.

The study aims to develop A Web-based Ordering, Inventory, & Feedback System using Long Short-Term Memory (LSTM) - Based Sentiment Analysis for RTEA Shop. The specific objectives are:

Develop feedback platform with LSTM sentiment analysis: Build a system to gather feedback (social media, surveys, reviews) and classify sentiment (positive/neutral/negative) using an LSTM algorithm.

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Automate inventory & personalize recommendations using sentiment: Use sentiment-derived insights to forecast demand (automating inventory/restocking) and generate tailored product recommendations.

Evaluate impact & ensure ISO 25010 compliance: Measure the system's effect on operational efficiency/service quality (via reports/user feedback) while ensuring compliance with ISO/IEC 25010 standards.

Implement role-based access control: Define and implement access-specific modules/interfaces for admin, staff, and customer roles.

SCOPE

The main goal of this project is to set up and execute a data-driven system for RTEA that enhances customer service and business operations through the use of sentiment analysis, real-time inventory tracking, and a smart order system. RTEA is able to use customer feedback, monitor inventory, and purchase things based on current usage rates because the system provides the same functionalities for both frontline and delivery operations. The scope consists of:

Smart ordering system: An online ordering platform that allows users to view wait times, check item availability, and place orders. When combined with inventory, it guarantees real-time updates and lessens the annoyance of waiting during busy times.

Inventory Monitoring: Provides real-time tracking of raw supplies, such as milk and tea leaves. To avoid stock-outs or overstocking, the system forecasts demand and notifies employees of usage.

Consumer feedback system: Classifies consumer comments from surveys, social media, and mobile apps as neutral, negative, or positive using LSTM-based sentiment analysis. Management decisions are guided by insights.

Report Generation & Dashboard: Offers administrators automated reports on inventory, sales, and feedback via an intuitive dashboard for decision-making.

Multi-User Roles: Provides role-specific access and functionality to admin, staff, and customer accounts.

Quality Standard: To guarantee functionality, dependability, usefulness, and efficiency, ISO/IEC 25010 standards were used in the design and evaluation process.

LIMITATION

Despite its innovative methodology, the SENTIMART system has a number of significant drawbacks. The platform's data dependency limits its efficacy; it excludes other input formats like voice or image-based input and requires a significant amount of text-based feedback for accurate sentiment analysis. Real-time processing delays during periods of high usage may have an impact on performance and the promptness of decisions. The system's immediate applicability to other industries without substantial change is limited by its industry-specific design for specialty tea sale. The lack of OTP verification compromises security and may lead to user authentication issues. Additionally, the cloud-based architecture requires current devices and reliable internet access, which may limit accessibility in places with unreliable networks. These restrictions point to important areas for further development and improvement, without reducing the system's fundamental value.

Theoretical Framework

The following theories, conceptions, ideas, and presumptions form the theoretical basis for comprehending this research inquiry:

Sentimart's core intelligence relies on LSTM (Long Short-Term Memory) networks to identify customer emotion through text. The results of this analysis are not only reported, but also actively used by

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recommendation algorithms to create personalized customer experience and demand forecasting algorithms to predict the needs of a given stock. The primary and crucial task at the core of the text analysis is the use of preprocessing libraries to clean and support feedback information. These algorithms form a model in which customer commentary connects and provides intelligent suggestions to the inventory and targeted assistance.

Just-in-Time (JIT) inventory theory is the foundation of Sentimart's stock management strategy (Smith & Johnson, 2019). By linking LSTM-derived sentiment trends (such as increasing positive mentions of "matcha latte") to real-time demand forecasting, the system automates reorders and minimizes stockouts and overstocking, in contrast to manual methods that Gonzalez (2020) found reduce sales by 15% in Philippine milk tea shops.

Customer Experience: The Customer Experience (CX) hypothesis ensures that the system boosts loyalty, claim Lemon and Verhoef (2016). Sentimart's recommendation system customizes products (for example, recommending "lychee jelly" to fans of oolong tea) in accordance with Tolentino's (2022) study on Filipino consumer preferences. Sentimart also detects emotional cues to start service recovery, such as annoyance in "Waisted 30 minutes!"

Conceptual Framework

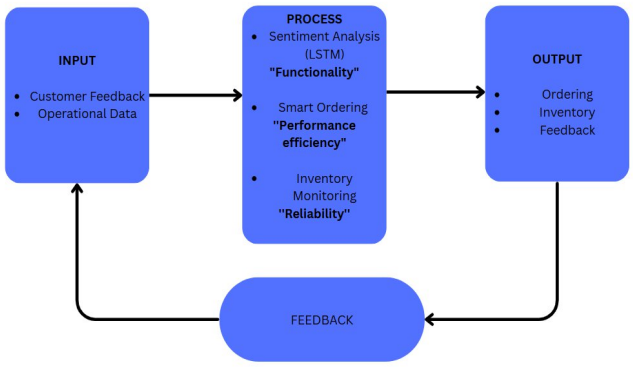

Figure 1: Input-Process-Output Model

The Input Assume that active listening and observation are the first steps in this system. It draws in real-world customer voices, including reviews, grievances, and general feedback to understand their feelings and experiences. At the same time, it uses the company's internal pulse to collect operational data, including sales statistics and most importantly real-time inventory level pictures.

The Process Technology analyzes client feedback in-depth using an AI model (LSTM), identifying feelings like happiness or frustration in addition to keywords. It also keeps an eye on inventory in real time while doing this. The "Smart Ordering" algorithm decides how to best reorder merchandise by combining stock data and customer feedback, ensuring that popular items remain available while preventing stock surplus. Last but not least, "Feedback Implementation" puts insights into practice by enhancing goods, addressing shortages, or streamlining orders.

The output of these intelligent processes are transformed into physical things. Customers see a noticeable change since they have individuals listening to them and acting on what they say. They also know that when they are looking for a certain product, it is probably included. Employees gain greater knowledge and discover a clear connection between what customers believe and what is happening on the job site, such as declining sales or stock outs, which empowers them to make wise decisions. Smarter data in terms of "Ordering" selections and more precise statistics in terms of "Inventory Feedback" are clear indicators of success.

Review Of Related Literature

Wu, Xia, and Tian (2025) claim that sentiment analysis has emerged as a crucial tool in e-commerce because it allows companies to glean insightful information from consumer reviews, improving customer engagement

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and operational decision-making. With an accuracy record of 89.7% in evaluating customer comments, their AI-powered sentiment analytics system proved how real-time client sentiments can inform inventory planning and service enhancements. According to Gajula (2025), specialty beverage shops looking to stand out in a crowded market can improve customer happiness and loyalty by implementing sentiment-aware recommendation systems, which provide a more customized customer experience.

On a smaller scale, Sahagun, Flores, and Jocson (2022) evaluated consumer happiness at coffee shops by using sentiment analysis to Google Map reviews. They discovered that real-time feedback analysis might aid in improving the quality of services and that electronic word-of-mouth had a substantial impact on customer views. This demonstrates the need of intelligent systems, such as those suggested in Sentimart, in converting user feedback into useful enhancements. Tan (2019) showed that consumer loyalty in the milk tea sector is strongly predicted by trust and satisfaction. In order to ensure product uniformity and fast service, two factors that impact customer trust, the study emphasizes the necessity of technology like smart ordering and inventory management.

Pineda et al. (2023) created a system called TeaTrack that analyzed Facebook comments on milk tea brands using a hybrid sentiment analysis model (CNN + RNN). According to the study, computerized review scoring could help business owners react faster and more precisely to actual consumer satisfaction.

Synthesis

In order to enhance consumer satisfaction and operational efficiency in the food and beverage industry, the literature keeps endorsing the growing usage of AI, particularly sentiment analysis (under the superior deep learning algorithms like LSTM and CNN) and inventory management. Otherwise, however, other technologies on the market (like TeaTrack and FeedBot) are far less capable of analyzing data or responding automatically, and they do not integrate this feedback into more extensive inventory management procedures (like real-time inventory control) or intelligent ordering. Sentimart, a direct application of contextual sentiment analysis via LSTM to directly downstream inventory and ordering choices and single feedback to action loop, currently fills the gap. Additionally, it adheres to ISO 25010 standards, which improves its robustness in terms of usability, reliability, and efficiency. This goes beyond the scope of the research at the time, which was carried out in two areas but not comprehensively: customer engagement and the backend retail operations of specialty tea businesses.

METHODOLOGY OF THE STUDY

The research design employed in the study was descriptive research design. This method deals with gathering and processing of numerical information to characterize the quality of performance of the system.

Data collection techniques are used to collect information and assess variables directly. In this study, an assessment process is used to collect primary data. To measure the efficacy, performance, and caliber of the research output, the assessment results are quantified, described, and interpreted using a rating scale. In a similar vein, secondary data is obtained by searching online and using library resources to find relevant studies and books.

The System Development Life Cycle (SDLC) model is used for efficiently planning, designing, developing, testing, and deploying the information systems or software. It comprises a series of phases that guide the creation and development of a computer-based system, covering the entire process from initial concept to development, release, and ongoing maintenance.

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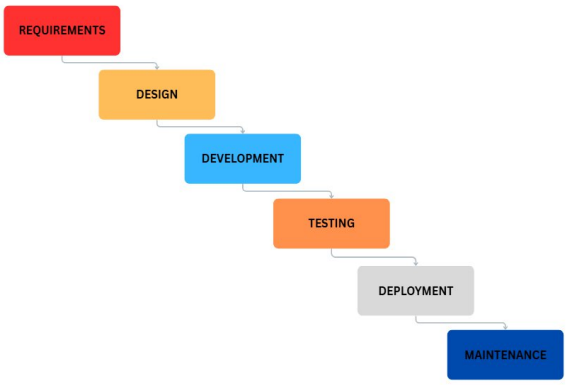

Figure 2: SDLC Waterfall Model

Sentimart employed the Waterfall Model since its needs (smart ordering, inventory monitoring, and LSTM analysis) are well-defined and consistent. Requirements (defining features), Design (system specifications), Implementation (coding), Testing (validation), Deployment (go-live), and Maintenance (updates/bug patches) are the well-defined phases that the project followed. This framework offered thorough documentation, controlled progress monitoring, and the essential quality support for the capstone project's effective completion within its parameters.

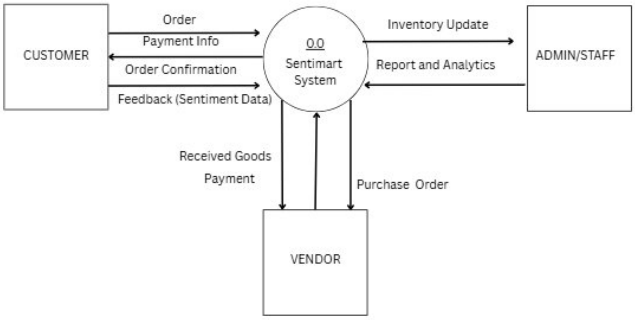

Figure 3: Context Diagram

Context Data Flow Diagram provides a general picture of how the Sentimart System interacts with its external parties Customer, Staff, and Vendor. The customers make their orders, payments and feedback, and the system acknowledges orders and analyzes sentiment information. The staff get to manage inventory updates, get reports and analytics and Vendors get to manage purchase orders, payments and goods delivery. This illustration depicts that Sentimart can be used to manage ordering, inventory, and feedback centrally.

Respondents of the Study

Two categories of respondents participated in the study: (a) user respondents and (b) technical experts. Based on their ability to make frequent purchases and familiarity with RTEA Shop's offerings, a sample of forty (40) user responders are selected at random. In order to assess the system's usability, interface design, and customer experience, these users also examined it from a practical standpoint, looking at things like ordering, providing feedback, and managing accounts.

Ten (10) experts in the computer industry who specialize in web development, database administration, or machine learning make up the technical respondents. These experts evaluated the technical aspects of the system, including the system's architecture, code, LSTM sentiment analysis accuracy, and compliance with ISO 25010 standards.

The two groups have a combined total of fifty (50) respondents and play a crucial role in providing input through organized evaluations. This strategy ensured a broad point of views.

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Development and Evaluation Procedure

Various development tools and technologies are applied in the creation of the system. These tools can be classified as different programming languages, frameworks, and platforms necessary for building the front-end and the back-end and hardware components of the system. These are:

Visual Studio Code: Source code editor for system development.

PHP: Web Application Framework.

HTML: Provides structure and content of web pages

MySQL: Relational database system.

CSS: Styles web pages' design, layout, and responsiveness.

LSTM Algorithm: Logic for scheduling appointments in order of request.

Data Analysis Plan

The ISO/IEC 25010 Software Quality Model, a worldwide framework for evaluating software systems' overall quality, is chosen because it offers a thorough and organized collection of quality attributes that complement the system's goals of usefulness, dependability, and user happiness.

In order to evaluate and validate the system's performance and user satisfaction levels, the researchers used the proper statistical methods to examine the data collected from respondents. The data obtained from evaluation responses are quantitatively analyzed using these techniques:Weighted Mean: The overall rating for each ISO 25010 quality attribute is calculated using this statistical technique, which also summarizes respondents' input. The weighted mean enabled the researchers to gauge the system's acceptability across a number of variables.

Frequency Percentage: This statistical technique determines the respondents' distribution by grade level. A percentage of the results are shown.

The researchers collected respondents' opinions on the system's general satisfaction, usability, and quality using a four-point Likert scale. Respondents are able to rate their experiences quantitatively using a scale that went from the lowest "1" to the highest "5" level of satisfaction. "Strongly Disagree" for "1", "Disagree" for "2", "Agree" for "3", and "Strongly Agree" for "4" are the interpretations of the numerical values.

The evaluation tool's statements matched each ISO 25010 feature, allowing the researchers to assess each attribute's degree of compliance based on the opinions of user and technical respondents.

By offering an unbiased way to evaluate respondents' comments, this rating system made sure that the evaluation's findings could be meaningfully and statistically analyzed. The researchers are able to gauge the general acceptability and efficacy of the system from the viewpoint of its participants by combining the Likert scale results with the weighted mean and frequency percentage (%).

The System

The study introduces Sentimart, a web-based system that uses Long Short-Term Memory (LSTM) sentiment analysis to optimize operations for specialty tea retailers like RTEA Shop. The system combines smart ordering, real-time inventory tracking, and customer feedback analysis into one platform, enabling data-driven demand forecasting, personalized product recommendations, and predictability in inventory management. Sentimart uses technologies like Laravel (PHP), Livewire (dynamic interface), MySQL (database service), and GitHub (version control service). The system integrates customer opinion directly in operational decision-making, supporting service quality, reducing operational costs, and increasing customer satisfaction in the competitive beverage market.

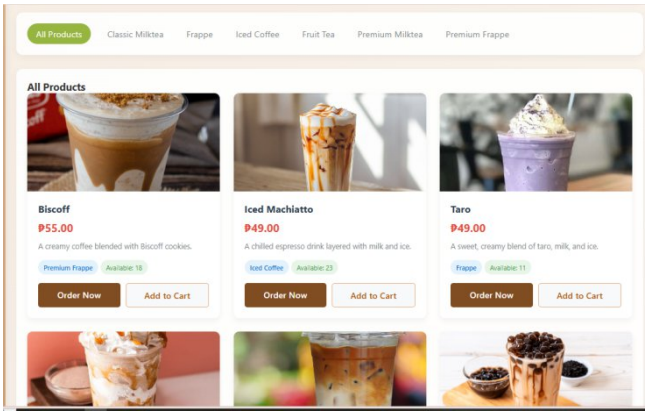

Figure 4: Smart Ordering Page

This number represents the Smart Ordering System, which is an online order center that gives an idea of available products, check the stock position, and place orders. It will be integrated with the inventory module to give real-time updates about the stock and availability of items to avoid waiting time during the busiest periods and it will allow a seamless process of order taking.

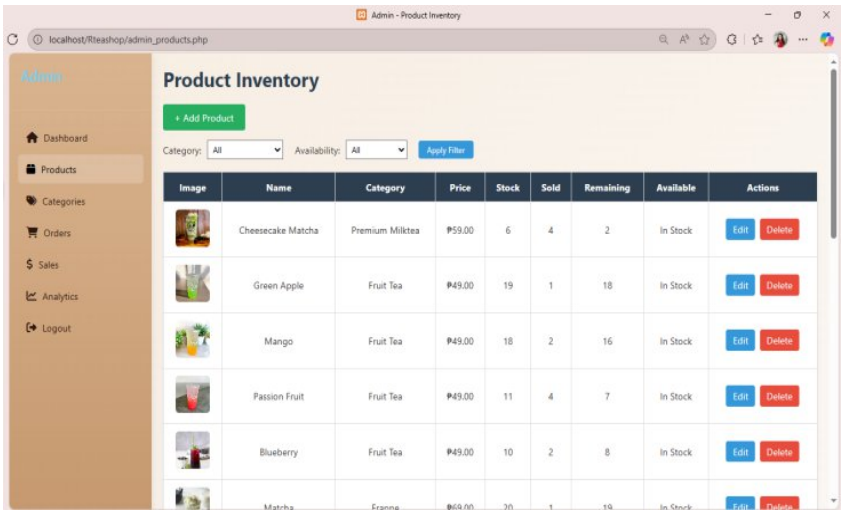

Figure 5: Inventory Page

This figure shows the Inventory Monitoring Module that can track in real-time the raw materials namely tea leaves, milk and other ingredients. It assists the staff in tracking the stock quantities, demand, and avoidance of stock-out or excessive stock-outs by automatically informing the staff of the usage and inventory state.

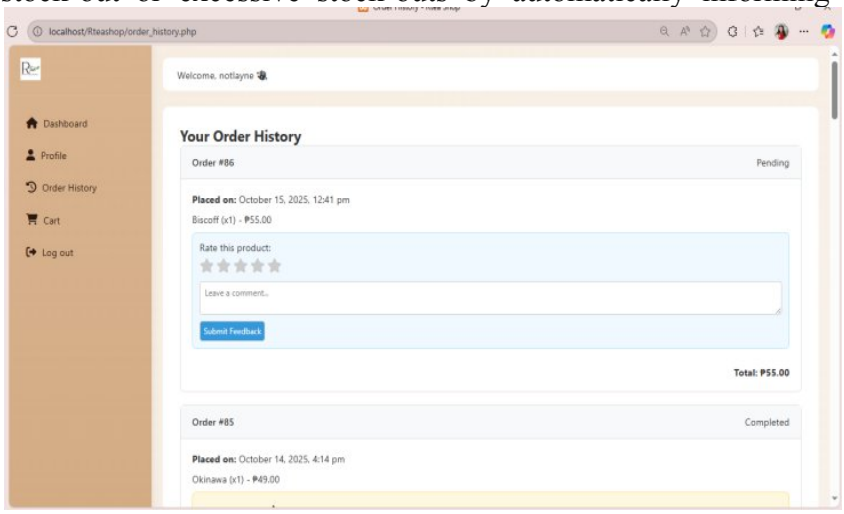

Figure 6: Customer Feedback Page

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This figure represents the Consumer Feedback System, which is a system that collects and presents customer feedback regarding their past transactions. The sentiment analysis model based on LSTM will categorize the comments in either negative, positive, or neutral, which will enable the management to determine areas where they can improve their services or areas where they are doing well.

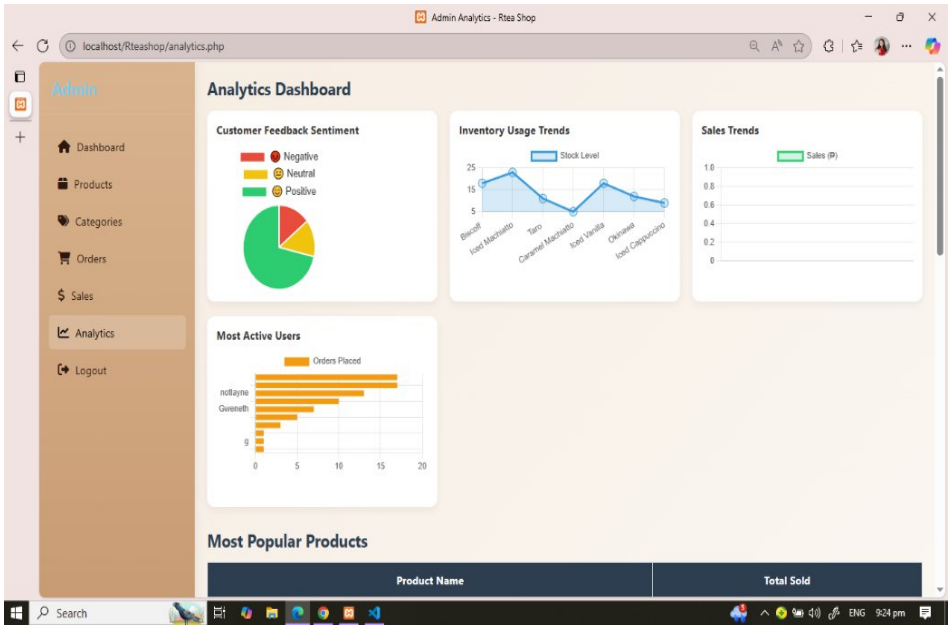

Figure 7: Report Generation Page

This figure shows the Report Generation and Dashboard Module that automatically generates reports about inventory, sales, customer sentiment, and user activity. The dashboard also has a Customer Feedback Sentiment chart which shows the feedback visually using emoji based indicators - positive, neutral, and negative. It also displays Inventory Usage Trends, Most Active Users, and Most Popular Products providing the administrator with an idea of how the operations are performed. With these analytics, it allows making data-driven decisions with the help of this system, the administrator can follow the customer satisfaction rate, and manage the stock levels at the same time as well as recognize the sales patterns to enhance the overall shop efficiency and performance.

Assessment: Summary of Respondents on the System

Two categories of respondents evaluate the system. The first group consists of the real users who assessed the system's suitability for their needs, practicality, and ease of use. Technical experts make up the second group that looked at the system's dependability, effectiveness, and technical soundness. Both groups adhered to ISO 25010, an international standard that offers precise criteria for evaluating software quality, to ensure the evaluation is methodical and reliable.

Respondents (groupings)	Size (n)	Percentage
Users	40	80%
Technical	10	20%
Total (n)	50	100.0%

Table 1: Distribution of Respondents

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Table 1 displays the number and proportion of respondents who took part in the assessment. Of the total, forty (40) participants, or 80%, are categorized as user respondents, while ten (10) participants, or 20% of the total, are classed as technical respondents. This indicates that the technical experts, who assessed the application's performance and functionality, contributed less comments than the real system users.

A summary table shows a comparison analysis of the similarities and differences between the user and technical respondents' viewpoints. This comparison helps assess whether the program meets both user and technical satisfaction standards.

Criteria (ISO25010)	Respondents (50)			
	Users (40)		Technical (10)	
	WM	VI	WM	VI
1. Functionality	3.6	SA	3.4	SA
2. Reliability	3.5	SA	3.5	SA
3. Efficiency	3.6	SA	3.4	SA
4. Usability	3.5	SA	3.5	SA
5. Portability	3.5	SA	3.6	SA
Overall Average Mean	3.5	SA	3.5	SA

Table 2: Summary & Comparison of Evaluations of Respondents

The summary and comparison of respondents' assessments using ISO 25010 criteria are displayed in Table 2. Note that the users' average mean score for Functionality and Efficiency as well as technical respondents' Portability category is 3.6, which is somewhat higher than the average score of 3.5 for the other criteria, all of which are regarded as "Strongly Agree" by user and technical respondents. Overall, both respondents have identical 3.5 average means interpreted as "Strongly Agree". These shows that the system adheres to ISO 25010 standards.

Ethical Considerations

The data gathered through the respondents is confidential and intact. The information of respondents is confidential and no personally identifiable information of the respondents is given out without consent. It is based on the principle of voluntary participation of the research, according to which the respondents do not suffer any consequences and can withdraw themselves at any time. Data security is highly realized to avoid illegal access and abuse of information. Lastly, the results are presented in a truthful and fair manner and no kind of manipulation or prejudice is taken to ensure that the research findings remain valid.

SUMMARY

Sentimart is an online ordering, stock and feedback site, which aims to satisfy the requirements of Rtea Shop. The prime purposes of such a system include giving the customers an effortless ordering system, enabling the employees to track the degree of stock, and utilizing sentiment analysis based on the Long Short-Term Memory (LSTM) to analyze the remarks of the clients.

To do this, it requires an automatic sentiment analysis application, an inventory management module for the employees and an easy to use ordering interface by the customers. Still on the same issue, the users and the technical respondents are in agreement with the acceptability and usefulness of the application in the ISO 25010 evaluation format.

The study is significant to both store owners and the application users as it develops a convenient design of integrated ordering and inventory system with intelligent feedback analysis. It saves time in monitoring inventory, decreases error in order taking and gives a rich customer satisfaction information.

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CONCLUSION

The evaluation findings showed that both groups rated the system highly with respect to all the ISO 25010 quality characteristics, functionality, reliability, efficiency, usability and portability with weighted means between 3.4 and 3.6 that is construed to be Strongly Agree.

Even though the level of consensus across both categories is good with respect to how the system is performing, the users appeared to rate it highly in areas that covered ease of navigation and capability to accomplish the things that needed to be done though the technical scores are lower and yet high in some areas that relate to technical optimization and flexibility of the system. This type of similarity of scores indicates that the system is user friendly and even technically sound enough to meet the needs of the end-users and even experts. And therefore, it is said to be highly acceptable for deployment.

RECOMMENDATION

Future researchers ought to routinely review consumer reviews and ask participants to flag the more challenging ones. They can then further train the LSTM using this labeled data. The results should become more reliable as a result. Additionally, look for customer comments where it's difficult to infer the sentiment. Ask someone to read those comments and write down what they think. Include this data when training the LSTM. By doing this, bias will be reduced and accurate results will be obtained.

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