CLICK AND TRACK: OCR-ENABLED EXPENSE TRACKING SYSTEM FOR 39ers PH BUHAY NA TUBIG

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INTRODUCTION

The study aimed to develop an expense tracking system tailored for 39ers PH Buhay na Tubig. It would also generate expense summaries and income statements. The system was accessible to various devices such as desktops, laptops, mobilephones, and tablets. It was built as a Progressive Web Application with the help of OpenCV and Pytesseract. The researchers proposed an expensetracking system integrating optical character recognition (OCR) technology to enhance efficiency in expense management for small businesses. The online expense tracking system was designed by 39ers PH Buhay na Tubig. It uses Optical Character Recognition (OCR) technology for automaticexpense data extraction of printed receipts. The system was limited to acceptingprinted receipts only, as it did not recognize other types of financial documents or handwritten receipts. It does not include sales management because 39ersPH does not issue official receipts to their customers and instead uses a manual sales ledger. It was also limited to recording and categorizing expenses and entering monthly sales to generate expense summaries and income statements.

METHOD

Use Case Diagram of OCR-Enabled Expense Tracking System. Two external entities, the Owner (Admin) and Bookkeepers (Employees), are communicating with the Progressive Web Application to carry out the expected functionalities of the system. The testing procedures conducted on the progressive application, in terms of suitability, security, and portability, are shown in Table 1. The scope of information maintained in the system is illustrated using an entity relationship diagram (ERD), as shown in Figure 22. The OCR-enabled Expense Tracking System manages the storage and retrieval of the data needed for system functionalities. The progressive web application was developed based on the design specifications. This section discusses the procedures followed on how the progressive webapplication was developed. The data flow consists of the unique user profile information. The bookkeepers can capture or upload printed receipts where every receipt is entered. The user may capture the receipt via camera icon or upload an image of the receipt. The owner can view the expenses list of the restaurant in the current month. The study developed a progressive web application about an OCR-Enabled Expense Tracking System. The user can monitor analytics with the weekly/monthly/yearly expenses by gaining access to the expense records database. The evaluation instrument that was used to assess the acceptability of the system was adapted from the ISO 25010 titled ?Systems and Software Engineering ? Systems? and Software Quality Requirements and Evaluation (SQuaRE) ? System and software quality models? The following procedures were conducted to evaluate the acceptable of the progressive web app. The study employed various modeling tools to analyze and map out the necessary components for the development of the progressive web application. The owner had the access to add a new expense category that would be essential in recording expenses. The security of the expense tracking system was evaluated in terms of accountability and confidentiality. The progressive web app was demonstrated and explained to the evaluators on how to operate it. The users can viewexpense records per category or receipt. The user can also delete a user account if the employee has resigned or no longer affiliated with the restaurant. The researchers developed a

progressive web application of an OCR-Enabled Expense Tracking System. The system included reporting and analytical features to help the business to prepare expense reports and income statements. The researchers developed the web application to help 39ers PH Buhay na Tubig. The image processing and OCR algorithm for extracting and tracking the company?s expenses from digitized receipts included the following steps: changing the password, the owner could be complacent that the system would be safe and secure. Portability testing focused on app compatibility across devices and platforms. Expense Records was tested for seamless receipt and data verification. Password Strength testing ensures enforcement of strong password policies. Data Encryption testing verifies that sensitive data is encrypted for confidentiality and protection. The web app should.function correctly and display properly on mobile phones running different operating systems. The app should also. display correctly on computers running different software versions. The system should.enforce strong password Policies and Password Strength Tests. The user can view total daily expenses per category and a pie graph.

RESULTS

The OCR results section displays the extracted data from the printed receipt, on the left part of the section is the scanned printed receipt. The progressive web app obtained the highest rating under ?Reliability? with a weighted mean of 3.67 described as ?Highly Acceptable? The integrated OCR technology obtained its second highest rating. under ?Usability? with a weighing mean of ?Highly acceptable? The user can click the ?Generate? button to create the report. The integrated OCR technology obtained its lowest rating under ?Security? with a mean rating of 3.47 but is still described as ?Highly Acceptable? The consistent operation of the OCR integration, with minimalCLICK AND TRACK: OCR-ENABLED EXPENSE TRACKING SYSTEM 130 Georgianerrors during receipt data extraction, was acknowledged. The Profile page provides the users with access to manage their personal settings and information such as the name, email, user ID, role, and password. The progressive web app obtained its second highest rating under ?Portability,? which is described as ?Highly Acceptable? This rating suggests that the. users showed satisfaction with how the progressive. web app adeptly adjusted to different screen resolutions. The progressive web. app is versatile and accommodating, as it effectively.adapted to various screen sizes, enhancing accessibility and user satisfaction. The app's reliability, ensuring it was consistently.accessible when needed, contributed to a positive user experience. The developed progressive web application used HTML, CSS, PHP, JavaScript, and Service Workers. The application did not include communication features between admin and bookkeeper users. The progressive web app was capable of handling features such as creating user.accounts, managing expense categories, adding and managing. expense records, viewing of expense records. It was also capable of generating expense reports and incomestatements. The app was designed to facilitate the daily expenditures of the Buhayers. The users viewed expense records per category or receipt. The web app was able to function correctly on different screen resolutions and browser configurations. The users noted the versatility of the OCR libraries, like OpenCV and Pytesseract,integrated into the progressive web app, receiving a rating of 3.67. The app can be used to manage and monitor daily expenditures. It can

also be used for monthly, yearly, or weekly comparisons as users can choose on those three categories. It is possible to edit the sales amount on the Edit Sales Amount page. Progressive web app was developed to help streamline financialmanagement. It was developed for a small food and beverage restaurant. The grand weighted mean obtained was 3.66 which is described as ?Highly AcceptableAcceptable? The app also served as an automated method of generating Expense reports and income statements. It is not editable, as only Bookkeeperaccounts can be created by the Admin. The app is a robust and scalable solution, providing a seamless user experience. The expense tracking system, which.incorporated OCR technology, utilized Pytesseract and OpenCV to extract text data from.printed receipts. The system's efficiency was enhanced, improving daily expense tracking for. the restaurant branch. The main area of the.ulent Expenses tab displays a comprehensive list of all recorded expenses. There was notification that updated the user whenever there is no expense record, encouraging user engagement. The web app was able to function correctly on mobile phones running different operating systems. The app was responsive to different screen sizes and orientations. sensitive data, such as passwords, were encrypted both at rest (in the database) and intransit. The app was highly acceptable in terms of appearance and integrity. It was easy to use, with different user roles (e.g., admin, bookkeeper) accessible at the same time. It displayed a comprehensive summary of the financial performance over the selected period.

DISCUSSION

The system underwent testing in terms of functional suitability, security, and portability. The progressive web app received a highly acceptable rating for its adaptability. Despite receiving its lowest security rating, the users still found the OCR technology integrated into the app highly acceptable. The development of the Progressive Web Application (PWA) with cross-platform compatibility was achieved. The system was employed with the help of the following tools: the MySQL database, Pyesseract, and the PyCRC library. The developed progressive web application was skillfully crafted to include the following features: Optical Character Recognition (OCR) technology was integrated for automatic expense data extraction of printed receipts. A centralized database was established for digitized expense documents to provide accessibility to the owner. The app's effective meeting of user needs, coupled with its intuitive layout, clear instructions, and visually appealing design, contributed to its outstanding usability assessment. The following recommendations are proposed to further enhance the developed Progressive web application.CLICK AND TRACK: OCR-ENABLED EXPENSE TRACKING SYSTEM 132.