A computer screen shot of a computer

Description automatically generated

Smart Receipt Management and Extraction

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# Background of study

Managing the accounting of a company is a long complex work but therefore “plays a significant role in the effective management process (Alabdullah, 2019), and one of the tasks is to log all the differences expenses for varied reasons. Therefore, the only way is to manually extract and store all this information in their receipt paper, which represents repetitive work and a big loss of time and energy which could be placed into more important tasks. A few solutions exist but nothing corresponding to the Mauritian market either professionally or personally but are limited and expensive.

# Problem Statement

Like said precedent, there’s multiple viable solutions such has “Recipator AI” (AI, no date) or “Veryfi” (*Transform Documents into Actionable Data in Seconds using Veryfi OCR API*, no date) and thesis about the receipt extraction like “Information Extraction From Scanned Invoices using Machine Learning, OCR and Spatial Feature Mapping Techniques”(Darsha, 2023) or “Utilize OCR text to extract receipt data and classify receipts with common Machine Learning algorithms”(Odd and Theologou, 2018) but therefore they are limited in feature. The different theses existing for similar projects all use different technologies but seem all to be missing an accessible interface to be used for common user. Moreover, these solutions were made mostly for foreign country and custom solutions made specially for Mauritius Island

# Description of the Project

## Aim

[merge into one paragraph]

The project “Smart Receipt Management and Extraction” system is designed to streamline and simplify the repetitive and time consuming of handling, organizing and informatize receipt, whether physical or digital.

Therefore, the primary purpose of this project is to serve a comprehensive receipt extraction and management, offering the user a user-friendly solution.

## Objective

This project can be realize following these objectives :

* Make Literature review.
* Gather receipt data for model training.
* Develop image extraction model.
* Create a local server to host model.
* Develop mobile application front end.
* Develop receipt management feature.
* Test server-side feature
* Test Mobile application feature

## Description of the Project

[this is gonna be in project description]

[add a technical description of the technologies involve]

The system aims to help the user handle receipts through various method with core purpose such has:

**Receipt Management**: acting has centralized hub for their receipts.

**Data Extraction**: using image recognition and Optical Character Recognition (OCR) to extract data from the receipt.

**User Correction**: allowing the user to manually correct the data before storing it into the database.

**Analytics**: producing insights from their purchase habit to help them with their financial decision.

**Data Export**: to export their receipt data in popular format such as CSV and Excel.

**Report Generation**: generate reports to provide a summary of the user overview and habit.

Full feature list:

* Server side:
  + Text Extraction Model.
  + Receipt Recognition Model.
  + Image Processing to optimize model results.
  + Pdf extraction (conversion to image, separate multiple receipt).
  + Report Generation.
* Mobile application side:
  + Receipt Upload in picture or PDFs format.
  + Upload pdf to server side for processing.
  + Receive and display old receipt data from servers database.
  + Receive extracted data from model.
  + Correct received data if needed.
  + Display analytics about the user purchase.
  + Export data to csv and excel.
  + Send exported data by email.
  + Edit exported format.

# Key Activities of the Project

## Literature Review

For my Literature Review I will focus on each major aspect of my project to research and summaries the different technologies they have chosen and listing their pros and cons. Therefore, the deferent aspect to research and summaries would be the Receipt extraction, Mobile application development and financial analytics.

## Systems Analysis and Design

The design of the “Smart Receipt Management and Extraction” system has multiple interconnected features, but the system can be break into two key components, each serving their own functionalities: the Server Side and the Mobile Application. This separation has for purpose to ensure efficiency and effectiveness in receipt extraction and management and therefore optimize the user experience.

The server side is the backbone of our system, it contains the core functionalities for data extraction and management. It hosts the processing of receipt extraction composed of an image processing to achieve a high accuracy in the extraction, followed with an advanced image recognition model and use Optical Character Recognition (OCR) to extract the data. A Database is also integrated into the server side to efficiently store and manage the extracted data to ensure secure and organize storage. The server side is also responsible for managing and facilitating communication within the Mobile Application allowing data exchange within the user interface.

On the other side the Mobile Application is the user-facing component of the “Smart Receipt Management and Extraction” system aiming to provide a seamless experience accessibility for users. Users can easily submit their receipt image or pdf through the application, which is transmitted to the server side for the data extraction. Moreover, the Mobile application also have other critical features such as the ability to the user to validate the result produced by the extraction process to ensure precise and exact analysis, extract their data in and CSV or Excel format. Additionally, the app provides insight on the user purchases historic and habit, allowing them to make financial decision by visualizing the habit and spending patterns.

## Implementation and

To implement this project, the different components will be developed and implemented in a precise order to optimize the development time. The development will start with the gathering of the receipt dataset for training and testing purpose of the extraction feature, and at the same time working on the receipt image recognition and then the Optical Character Recognition. Then working on the local server to do the extraction work and the different reports generated on different server endpoint. For the last stage of the implementation, we will work the User Interface, more precisely on the mobile app front end in the beginning, then on the communication with the server and the other features left.

## Testing

For the testing of our system, we will assess independently the different feature of the servers and the mobile app with Unit testing to ensure the robustness and reliability of both the server and the mobile app to ensure quality insurance of the code, a good user experience and Rapid Issue Identification. Moreover, depending on the size of the receipt dataset used to train the data extraction model, we will use the Holdout Validation providing good evaluation with small dataset, otherwise the evaluation will be make using K-Fold Cross-Validation if a sufficient dataset is gathered.

## Evaluation

Our system evaluation is guided on verifying the well execution and realization of the system requirements with the analysis of key performance metric and rigorous testing are key components of our evaluation strategy to ensure that our system delivering its intended purpose.

# Project Plan

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Figure 1 - Gantt Chart

# Project Resources

To successfully complete our project, several resources are essential, either hardware or software as well as necessary data sources. The project resources are as follows:

Hardware:

* A smartphone for the user interface and image capturing functionalities.
* In an ideal scenario, a dedicated server would be used, but a local hosting on a computer would be a viable alternative.

Software:

* For database management, Postgres is planning to be used locally. If deported on a server, we will use the server cloud-based databases such as Redshift (if on Amazon Web Services).
* Visual Studio will serve as the integrated development environment (IDE) for the development.
* Flutter will be used instead of React-Native framework for mobile application development.
* Postman will be use for the API testing and debugging.

Data:

* Receipt images are a vital data source for testing and optimizing the data extraction model.

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