Initial Plan:

Enhancing Personal Finance Management through OCR and Data Visualization

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Project Description

"Enhancing Personal Finance Management through OCR and Data Visualization" aims to utilize data analyses and data visualization techniques to address the gap in personal finance management tools for individuals, specifically students. Majority of the existing financial insight or management applications, such as moss, pleo, concur, and more, are business oriented. A tool designed to help business track and manage their expenses might fulfil the basic requirements of individual users but cannot provide the insight they are looking for or understand.

Financial management tools, like mentioned above, are designed for businesses often include features that function well with business practices, such as tracking invoices, managing payroll, and preparing detailed financial reports suitable for stakeholders. These applications are designed to handle complex transactions, multiple accounts, and the tax implications that are specific to businesses, which might overwhelm any individual who lack knowledge in the relevant areas, while also making the interface and data visualization difficult to understand for individual users.

For individuals, especially students, the financial landscape is vastly different. They require simpler interfaces and functionalities that focus on daily expenses, personal budgeting, savings goals, and straightforward spending analytics. To understand what the students are looking for in the insight of the expenses and saving, we need learn more through interviews or anonymous surveys. Not to mention, business tools can be too complex, expensive, and feature-rich for individual needs, leading to a steep learning curve and unnecessary complications in managing personal finances. Individuals benefit from tools that are more accessible, intuitive, and focused on personal expense tracking and visualization.

The problem is faced by all students, whether they are home students or international students, they will face financial trouble, most of the time it is because they have little to no experience in managing their expenses. Hence, I plan to tackle this problem and more specifically for students.

Firstly, I will use Optical Character Recognition (OCR), which is an important used to interpret and convert different types of documents such as scanned papers, PDFs, or images into editable and searchable text. Since, I will be using a OCR API which is available to use ranging for open-source and paid services, I will not be going in too much detail as to how it works. In brief, it works by analyzing the shapes within images, detecting patterns that correspond to letters and numbers, and matching these to a database of known characters. Although it sounds simple it is a little more complex, OCR technology is particularly useful for converting receipts into digital data, despite variations in text style and image quality.

More importantly, the project will focus more on the use of Python's data visualization libraries (such as Matplotlib, Seaborn, and Plotly) to transform data, collected using OCR from receipts into intuitive and insightful visual representations. These visualizations have not been decided yet, like mentioned above I will conduct an anonymous survey to see what students are looking for in their financial insights, and what can help them to better understand their spending habits. The focus on data visualization is crucial for explaining complex financial data, making it accessible and actionable for the average user. The plan is to create a single dashboard which will visualize the data collect from the receipts, using the above-mentioned python libraries.

This project addresses a critical need for personalized financial tools that cater to individual (students) spending behaviours and preferences. Through iterative development and user feedback cycles, including interviews and surveys, the project will refine the visualized data to match user expectations, providing a tool for personal finance management. This aligns with the project title of enhancing individuals with the knowledge and tools to make informed financial decisions, using the principles of data science and human-computer interaction to enhance user experience and financial literacy.

Aims and Objectives

Aim: To develop a personalized financial management tool for students, by using OCR for receipt data extraction (image-to-text) and data visualization techniques for insightful spending analysis.

Objectives:

1. **To accurately extract financial data from receipt images using OCR technology.**
    - **Risk:** Variability in receipt formats and image quality may hinder accurate data extraction.
    - **Mitigation:** Implement and refine adaptive OCR algorithms capable of handling diverse formats and qualities.

2. **Conduct a comprehensive requirement analysis to understand student preferences for financial data visualization.**
    - **Risk:** Misinterpretation of student needs could result in a visualization that does not effectively aid in their financial management.
    - **Mitigation:** Utilize a mixed-methods approach for requirement gathering, like questionnaires/surveys, to capture a broad spectrum of student perspectives and preferences. Implement iterative design with student feedback loops to refine visualization tools.

3. **To develop intuitive data visualization interfaces that accurately represent students' spending habits.**
    - **Risk:** Complexity in visualizing diverse datasets in an intuitive manner for all users.
    - **Mitigation:** Employ user-centric design principles and iterative feedback to refine visualization techniques.

Feasibility

The feasibility of the " Enhancing Personal Finance Management through OCR and Data Visualization " project hinges on several factors that need careful consideration:

1. **Ethical Approval**: Since we will be looking for user feedback and surveys to understand user requirements for data visualization. In addition, all the data collected would be anonymous and doesn't require any personal data. A risk is the potential delay in obtaining this approval, which can be mitigated by early application, since supervisors are allowed to authorise anonymous non-personal data collection such as questionnaires and user feedback.

2. **Legal Issues**: Intellectual property rights concerning the OCR technology and data visualization libraries, open-source resources will be used to ensure avoiding an intellectual property right or securing license for the OCR API or data visualization libraries either personally or if available under university education license.

3. **Special Resources**: The development of this project will require access to an OCR API which may come with associated costs and access considerations. To address this, we will explore various APIs

with free tiers or educational discounts and plan for potential budget constraints. For database we will utilize a local database, that can be setup without any extra cost.

4. **Risk Mitigation**: In case of resource unavailability, the project scope can be adjusted to focus on a proof-of-concept utilizing simulated data. This would allow the project to proceed while demonstrating the core functionalities.

Work Plan

Weeks 1-2: Initial Research and Planning

- Investigate current OCR technologies and data visualization tools.
- Set up development environment and any necessary libraries for the project.
- Design Questionnaire to collect anonymous data on student's requirement.
- **Milestone:** Understand the background knowledge and complete initial plan

Weeks 3-4: OCR Implementation and Visualization Requirement Analysis

- Develop a prototype for receipt image capture and text extraction.
- Test OCR accuracy with sample receipt images.
- Collect the data from the questionnaire to determine the function and non-function requirements
- **Milestone:** Working OCR prototype that can extract text from images and visualization requirements
- **Deliverable:** A functional OCR system for receipt data extraction.

Week Easter Break: Contingency week

- Start working on the structure of the Final report
- Use this time as buffer to tackle any unexpected issues that might arise when working with OCR API.
- Collect receipts to create a sample dataset
- Expand my skills and knowledge on data visualization techniques

Weeks 5: Data Management

- Design database schema for storing extracted data.
- Implement data storage solutions.
- **Milestone:** Functional database system for storing receipt data.
- **Deliverable:** A database for storing user financial data.

Weeks 6-8: Data Visualization Development

- Create initial designs for data visualization interface based on the collect user requirements.
- Develop and test visualization features with extracted data.
- **Milestone:** Initial data visualization dashboard.
- **Deliverable:** An interactive data visualization dashboard for financial insights.

Week 9: User Feedback

- Conduct user interviews and surveys to gather feedback on the tool.

- Refine user interface (data visualization) based on feedback.
- **Milestone:** Updated UI design incorporating user feedback.

Week 10-11: Integration and User Testing and Evaluation

- Integrate OCR, database, and visualization components.
- Conduct thorough testing of the complete system.
- Deploy the tool for a selected group of users.
- Collect and analyse usage data.
- **Milestone:** User testing report with findings and potential improvements.

Week 12: Finalization and Documentation

- Refine system based on user testing results.
- Prepare final project report and documentation.
- **Milestone:** Submission of final report and complete project documentation.
- **Deliverable:** Final project report with research findings, methodology, and evaluation.

Meetings with the supervisor will scheduled on weekly basis for the first four week (before easter break) to ensure a smooth start for the project. Start from week 5 the meeting can be bi-weekly, of course unexpected issues or question regarding the project can be communicated before the meetings. Since this is just an initial plan this plan is subject to changes according to the circumstances and discoveries during the project timeline.

References

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