# Problem Statement and Goals
# Plutos

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Table 1: Revision History

| Date | Developer(s) | Change |
|---|---|---|
| 09/18/2024 | Angela Wang | Initial Draft |
| 09/20/2024 | Jason Tan | Environment section and touch ups |
| 09/24/2024 | Eric Chen | Update Appendix Reflection Questions |
| ... | ... | ... |

## 1 Problem Statement

### 1.1 Problem

Young adults often face challenges in managing their finances effectively, especially when it comes to tracking expenses and budgeting. Despite advancements in artificial intelligence (AI) and automation, many budgeting apps still require manual data entry or calculations, resulting in an inefficient and potentially inaccurate process. This inconvenience often leads users to poorly manage their budgeting or abandon it altogether, hindering their ability to optimize spending habits and achieve their financial goals.

### 1.2 Inputs and Outputs

**Inputs:** User's receipt photos and desired bugeting goals.
**Outputs:** Visualizations of the user's spending allocations in comparison to their set budget, and recommendations for how they may adjust their spending to meet their goals.

### 1.3 Stakeholders

Stakeholders include anyone who is looking to better manage their finances, set budget goals, and track their spending, with a focus on first and second-year university students who are just starting to live on their own.

### 1.4 Environment

The software product will be compatible for Android and iOS mobile devices with a functional camera.

## 2 Goals

Our goals include the following:

- Develop a machine learning model that can accurately (>90%) parse commonly purchased items (e.g., groceries, cleaning supplies) from a picture of a receipt.
- Develop a machine learning model that can accurately (>90%) categorize items into approprite, pre-defined spending categories.
- Develop a mobile application that allows users to take a picture of their receipt or manually input their expenses. These expenses would be stored in a database so that the user can review their spending history.
- Within the application, display visualizations of the user's purchases and spending allocations, and provide recommendations for how they may adjust their spending to meet their budget goals. These should be catered to the user's personal spending habits and goals.
- Allow users to set budget goals over different time intervals (e.g., short-term, long-term) and track their progress towards these goals.

## 3 Stretch Goals

- Build upon the base machine learning model to train on the user's personal spending data to provide more accurate item parsing and categorization (i.e., for items with similar names, the model can learn which category the user typically assigns them to).
- Build upon the base machine learning model to categorize items using user-defined/customizable spending categories.
- Build upon the base machine learning model to predict future spending based on the user's spending history and provide recommendations for how they can adjust their spending to meet their budget goals.

- Gamify the application to make it more engaging and encourate users to meet their budget goals and develop better spending habits.
- Allow users to input expenses through speech recognition, where the application can parse the user's speech and categorize the items accordingly.

# 4 Challenge Level and Extras

The expected challenge level is **general**. The primary challenge of the project is developing a machine learning model that can accurately parse items from a picture of a receipt, and to categorize them into appropriate spending categories. This requires a strong understanding of training and tuning models on image data to achieve high accuracy. Additionally, different items across various stores may have similar names or be difficult to recognize, which adds to the complexity of the task. The other part of the project is to develop a user-friendly mobile application, which is a more general software engineering component.

Furthermore, our team plans to include the following two extras:

- **Requirements elicitation**: We will conduct interviews and a survey to gather requirements from potential users to determine user needs and preferences.
- **Usability testing**: We will ask potential users to test the application and provide feedback on its usability and functionality.

# 5 Appendix — Reflection

1. **Why is it important to create a development plan prior to starting the Project?**

   Creating a development plan before starting the project is crucial so the whole team can discuss/agree upon the key project details and scope. It is vital to lay out the groundwork for our project and define the direction needed to achieve our goals optimally. We found it especially important to discuss team dynamics – specifying meeting details, expectations from each member of the team, and the general workflow plan. Defining these elements upfront helps keep everyone aligned and organized before we dive into the project details and implementation. Breaking down the project into high-level milestones allows us to create well-defined and achievable timelines to guide our progress.

2. **In your opinion, what are the advantages and disadvantages of using CI/CD?**

   We believe that CI/CD is a great tool due to it allowing automation and quality control within our development workflow. This significantly reduces manual testing labour and saves time which will be crucial for the development of the Plutos app. We aim to at least include running tests, linters, and formatters within our CI pipeline so that we may be confident that all changes made meet a certain quality level. One drawback that we will need to be aware of is that the setup of the CI/CD pipeline may pose a challenge due to the team's lack of experience in setting up such a workflow. Having too much automation could lead us to have false confidence in our code, especially if our test coverage is not meeting standards due to rapid development. It's important not to rely too heavily on the CI/CD pipeline and understand that it's a tool that is meant to help gauge the overall quality of our code and not something that will replace manual testing.

3. **What disagreements did your group have in this deliverable, if any, and how did you resolve them?**

   Our team had differing opinions when we discussed the timeline of our project. Some members felt we could reduce the time allocated for end-to-end testing from five weeks to three, while others preferred to extend the frontend and backend development by an additional week. We also had discussions for how much buffer time was needed to account for potential delays. After some discussion, we came to an agreement that the frontend and backend could be done in parallel, allowing us to dedicate 6 weeks to both sections. These differences were ultimately resolved through mutual understanding, as many of us would be unavailable during exam season in December and January. What ultimately helped us resolve our differences was the fact that we all remained realistic about potential challenges we might face in the future.

# 6 Appendix — Team Charter

## 6.1 External Goals

The team's objectives are to gain proficiency in AI/ML and to develop a well functioning application to showcase (and for people to try out) at the Capstone Expo. We also aim for the code and application to be clean and presentable for potential interviews.

## 6.2 Attendence Exceptions

All team members are expected to attend meetings. If a member will be arriving late or leaving early for any reason, it is their responsibility to communicate this beforehand and ask the team for a summary of what they missed. If a member cannot attend a meeting, they must present an acceptable excuse to the team before the meeting or ask for the meeting to be rescheduled.

## 6.3 Acceptable Excuse

Acceptable:

- **Medical reasons** – personal illness, doctor appointments, or urgent medical issues.
- **Family emergency** – unexpected situations involving immediate family members, such as accidents or serious health issues.
- **Work-related conflicts** – overlapping meetings, urgent project deadlines, or unavoidable last-minute tasks.
- **Technical difficulties** – internet or equipment failure preventing participation in virtual meetings.
- **Personal emergencies** – accidents, sudden household issues (e.g., plumbing, electricity), or car breakdowns.
- **Scheduled academic course** – a mandatory class or lecture that overlaps with the meeting time.

Not-acceptable:

- Oversleeping or poor time management
- Forgetting the meeting or deadline
- Conflicting social plans or events
- Claiming ignorance of the meeting or deadline
- Being "too busy" with other tasks without prior communication

### 6.4 In Case of Emergency

- Immediately notify the team
- Provide details about the situation and the expected impact on their availability
- If possible, share any work completed so far or delegate responsibilities to ensure the team can continue without delay
- Communicate updates on their availability as the situation progresses

### 6.5 Accountability and Teamwork Quality

Our team holds high expectations for the quality of work and preparation of meetings. Each member is expected to review relevant materials, contribute meaningful insights, and come prepared with suggestions and/or updates. In terms of deliverables, we prioritize accuracy, clarity, and adherence to any predefined guidelines or deadlines. Every contribution should reflect a high standard of professionalism, ensuring that it supports the team's objectives and maintains the overall quality of our collaborative efforts.

### 6.6 Attitude

All team members should:

- Be respectful of each other's ideas and perspectives.
- Approach problems with an open mind; disagreements should be expressed respectfully and non-aggressively.
- Aim to contribute a similar amount of work as other team members.
- Ask for help on a task if needed; do not spend an unreasonable amount of time being stuck on a task without external support.
- Stay up to date with project progress and share updates on one's own progress.

If a conflict arises with another member, those members should discuss it directly with the intention to resolve the issue cordially. If no resolution was achieved, the members must discuss the conflict with the team for the team's opinions.

### 6.7 Stay on Track

- GitHub Project Board and Issues: The team will use a GitHub project board to track tasks, assign issues, and monitor progress. Each member is expected to update their assigned tasks regularly and close issues when they are completed

- Development Plan: The team will follow the development plan outlined. Milestones, deadlines, and deliverables will be reviewed on the predetermined due dates
- Performance Management:
  - Rewards: Members who consistently meet or exceed expectations will receive recognition within the team and maybe a free bubble tea from their favourite tea shop!
  - Underperformance: Members who fail to contribute or consistently miss targets without valid reasons. Members can make up by taking on additional tasks or making up lost time.
  - Consequences for Missing Targets: If a team member consistently fails to meet contribution targets, the team will discuss with the member to understand why this may be happening and offer support.

## 6.8 Team Building

We will host a semi-competitive badminton tournament across members during McMaster Pulse drop-ins at least once per month. Other sport competitions may be discussed and considered, with possible suggestions being a maximum repetition bicep curl competition, a dynamic rock climbing move, and a maximum duration plank hold. We will also go out for bubble tea every other week to complain about our school workload and job applications.

## 6.9 Decision Making

In the event of a disagreement within the team, we will conduct a vote, and the decision will be based on the majority consensus. However, for critical decisions, a unanimous vote will be required from all team members before proceeding. The team will be consulted for all decisions so they may be thoroughly discussed.