**Project Proposal**

**Project Description:**

La Prima is a strategy game to create the most profit possible by running a coffee stand. In the span of 5 days, the goal is to make the most profit possible, where the profit is based on the recipe chosen, the inventory stocked, the price set for the coffee, as well as the weather.

**Competitive Analysis:**

A similar project online can be found at [www.coolmathgames.com/0-coffee-shop](http://www.coolmathgames.com/0-coffee-shop) where the user chooses the daily inventory of ingredients, the recipe for each unit of coffee, as well as the set price. Similar features consist of creating a unique recipe, purchasing items, calculating a profit, and generating people to buy the coffee during the day.

However, La Prima has features of AI, a “build your own level” course, and decoration options that differs from the original game. Using artificial intelligence, users may purchase hints that optimize the users’ profits based on the users’ set recipe and the weather. Additionally, the “build your own level” allows the user to create their own personal function to generate profit as well as the costs of each ingredient. Furthermore, the ingredients in La Prima do not expire for better user experience.

Finally, users can decorate their own stands using tickets that are earned from customer ratings.

**Structural Plan:**

Using object-oriented programming, data such as the inventory, recipe, and current earnings will be stored with specific functions. Tkinter event functions such as mousepressed and timerfired are key functions for the user to interact with the game as well as run the game simulator per day. There will also be a function for calculating how likely a customer is to purchase coffee as well as the profit that comes from that probability. The function to calculate the max profit will be based on parameters such as the weather, ingredient, recipe, and ratings.

Every day will have 3 main pages: the inventory and recipe page, the animations throughout the day during gameplay, and the results and summary of the day after either the day ends, or the ingredients run out.

**Algorithmic Plan:**

The algorithm complexity will come mainly from “hill climbing” a hard coded function to determine the maximum preference available as well as creating a general partial derivative calculator to determine the profit of any function given (which is the user input from the build-your-own-level course).

For the general solution, I intend to have a function for each ingredient in the coffee so that based on the profit function, set weather, set recipe, and set ratings, each function utilizes hill climbing to increase the profit function slightly until the profit starts to decrease, where then the ingredient is set to that specific value. I also plan to have the ingredients relate to each other so that each function is dependent on another.

By separating the user’s input, I will use different rules to determine the derivative of a function based on the specific variable (this is where the partial derivatives come in). I intend to use this calculator to then use the hill climbing to find the new maximum parameters for the optimal preference.

**Timeline Plan:**

I intend to have the hill climbing algorithm and the hints finished by November 25 and the partial derivative calculator by November 27. By November 28, I will have the build-your-own level course. Up until the TP3 deadline, December 1, I will be implementing features such as the game decorating and better animations as well as fixing bugs.

**Version Control Plan:**

I am using version control by using Google Drive on my student account to upload and access different versions of my code.

Graphical user interface, application

Description automatically generated

**Module List:**

I am not planning on using any external modules/hardware/technologies.

**Storyboard**

Diagram

Description automatically generated with medium confidence

TP2 Update:

I have decided to change the timeline plan, where I will finish the hill climbing algorithm by November 28 and the partial derivative calculator by the 29.

TP3 Update:

I have no longer implemented the “custom” level for the game in general, so a partial derivative calculator is no longer needed. I have also decided to discard the customization of backgrounds.