Project Proposal

Gardening and Crop Optimization Tool

Project Summary: This project involves creating a database that combines information about vegetables, precipitation patterns, and soil quality across different regions of the U.S. The goal is to help users identify the best areas to grow specific vegetables by analyzing these factors. The database will store data on optimal growing conditions for various vegetables, regional climate patterns, and soil quality metrics. A user-friendly interface will allow users to input a vegetable and receive recommendations on which U.S. regions are best suited for cultivating it, based on precipitation and soil characteristics.

Description: Our app will have two main functionalities. First, the user can input a specific crop and receive a ranked list of what areas the crop would thrive in. Along with this list, an interactive map will show the corresponding regions that would promote successful growth. The user can also make a reverse query, inputting a city or region and receiving a list of crops that would thrive in that specific area. We will determine how to match crops with regions based on factors such as precipitation, temperature, and soil content that can be found in public data sets. We will make our own ranking algorithm based on these factors as well. Additionally, we will create a function that will compare the price of buying the crop and the price of growing the crop so that users can make an informed decision on whether the crop will be profitable. We make a solution for finding what crops will grow the best so that farmers and gardeners can grow their crops successfully.

Technically challenging features: One creative component that we will try to implement to improve the functionality of our application is how we choose to indicate which areas are better to grow what crop. We can color our map of the U.S. with a gradient between red and green to show what location would be the best to grow what crop. The gradient should give a very simplistic view to the user as to which place will have the best yields for a certain crop.d

Usefulness: Our application is useful because it helps individuals, farmers, and agricultural planners make informed decisions about the best plants to grow based on a number of environmental and economic factors. By integrating weather patterns, soil quality, and grocery prices, the application offers insights into optimal planting strategies, supporting sustainable agriculture and potentially improving crop yields.

The basic functions of our app include location-based crop suggestions, weather forecasts and seasonal planning, grocery price integration, and historical trends. One of

the complex tasks that our project will do is to analyze grocery prices with the cost-effectiveness of different crops to make suggestions on whether it is more economical to grow or buy your produce. Another complex task is integrating multiple datasets to present clear suggestions. This will require complex backend data processing.

There are similar applications to our project but what makes ours stand apart is the integration of grocery price trends to help the user make a more holistic decision when gardening.

Realness:
1. Datasets:
    i. Crop recommendation Dataset
        1. This dataset will let us know what qualities in an environment is best to grow what crop
        2. Qualities:
            a. CSV
            b. Cardinality: Many types of crops
            c. Degree: 8
            d. Phosphorus % in soil
            e. Nitrogen % in soil
            f. Rainfall Needed
        3. https://www.kaggle.com/datasets/atharvaingle/crop-recommendation-dataset
    ii. Rainfall Dataset
        1. This dataset will show the rainfall statistics in various locations
        2. Qualities
            a. CSV
            b. Cardinality: Many cities
            c. Degree: 9
            d. Station
            e. Elevation
            f. HCCP
            g. Longitude/Latitude
        3. https://catalog.data.gov/dataset/u-s-hourly-precipitation-data-2
    iii. Soil Quality Dataset
   1. This dataset will show the qualities of soil in various locations

Functionality: Our application will feature an easy to use interface where users can search for specific crops or search for specific locations. There will be an interactive map on one side, while the other side of the website will display the best ranked regions/crops depending on what the user searched for. Colors will indicate the fitness of the region to grow specific crops.

We will also have a section for the user that they can change themselves which will consist of the vegetables/crops that they want to grow in their own garden. This will allow the user to be able to add what crops they want to grow, and delete some crops if they find some difficulty growing them. They can constantly update their garden, and we can also implement a tracking system that allows them to monitor the progress of their garden's development.

A low-fidelity UI mockup:
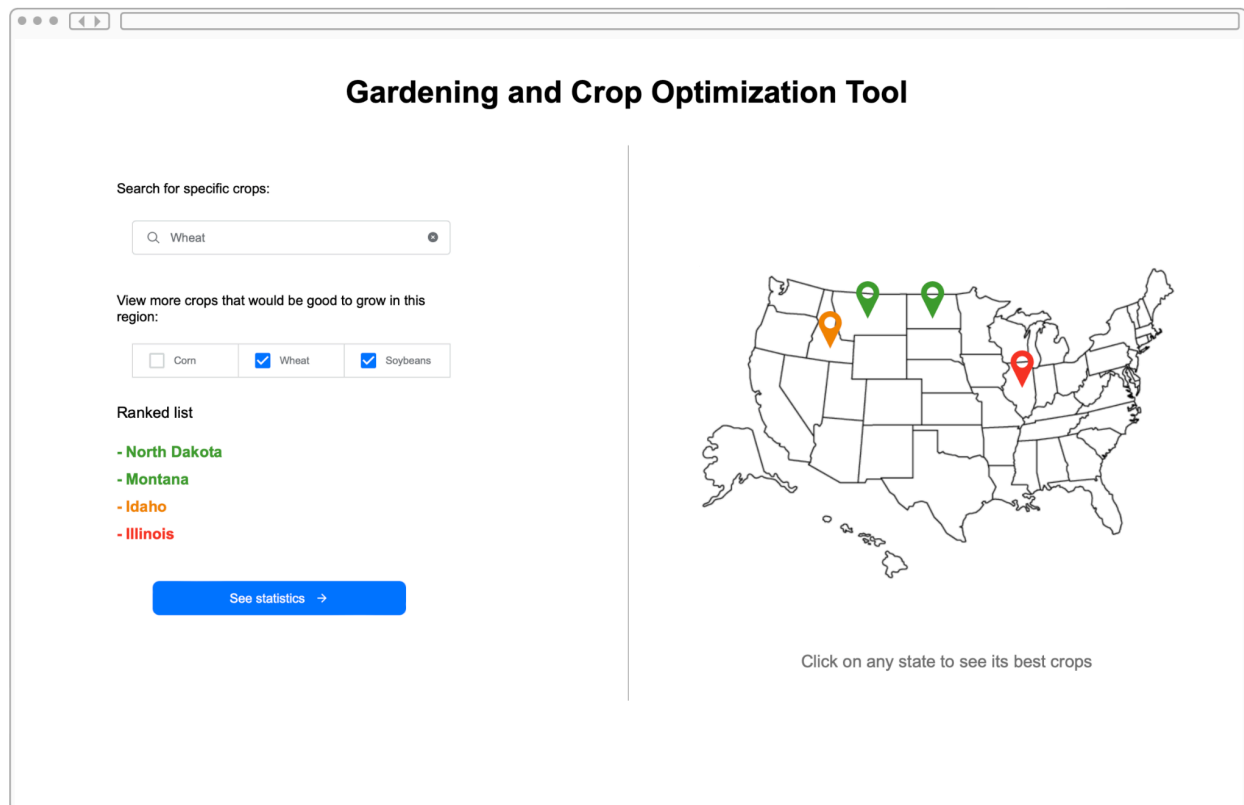
Project work distribution:

- Front End (Kenny and Alyson)
  - Create basic HTML framework
  - Create Map/Map functionality
  - Add styling
- Back End (Dimitri and Sam)
  - Clean/format data from datasets
  - Determine database structure (subtables, rules, etc)
  - Create ranking algorithm
  - Create Price comparison algorithm
- Integrating Front/Back end (Kenny, Alyson, Dimitri, Sam)