Engineering Track: Final Project Proposal

B351 / Q351

Basic Information

Project Title

Classifying a Supplement

Short Project Statement

There are hundreds of thousands of people who partake in some kind of exercise and many of them use dietary supplements for convenience or in order to fill gaps in their nutrition. Being able to identify what kind of dietary supplement a product is based on the ingredients/ serving size/ macro-nutrients/ and dosages could be useful to those that: are looking to get into supplementation, do not have a working knowledge of what kinds of ingredients to look for, and to compare and contrast products within the same class for effectiveness and quality.

Team Members

1. Name: Jason Zarco
2. Name: Amy Strafford
3. Name: Justin Mabry
4. Name: Joanna Njeri

1 Problem Space

1. Describe the problem space. What are the objectives, challenges, and constraints? What are some of the variations found in the problem space?
   (a) Objectives -
      i. Be able to categorize the given dietary supplements with 80 percent accuracy or higher.
      ii. Leverage a or multiple Classification techniques: perceptron, decision tree, Neural Networks in order to build an accurate model
   (b) Challenges -
      i. Dietary supplements with similar ingredients: Many dietary supplements use similar ingredients so they could fall into more than one class
      ii. Dosages: The dosages for certain ingredients within a product marketed to be a dietary supplement for a given class could be way higher or lower than the effective dose thus more factors would need to be considered to properly classify it.
2. What are some historical attempts to tackle the problem space? Include links and references where appropriate.
   (a) Classification based on brand: There are ai models on the internet that determine the brand of a given dietary supplement
   (b) Dietary supplement recommendations: These models recommend a dietary supplement or give nutritional advice.

2 Algorithms

1. What solution are you proposing? How will this compare to historical approaches?
   (a) Perceptron Model Proposal: Determine the most important/commonly found ingredients in a given class of dietary supplement determine if they are present within the product or not. More complex dietary supplements would require weights for the multiple ingredients that should be present and those that are just extra.

(b) Impact: Our model is fundamentally different compared to others I have found within the Dietary Supplement niche in that we would be utilizing the ingredients of the product in order to classify it.

2. What algorithms will you implement? Include links and references where appropriate.

(a) Algorithm: The perceptron model algorithm which utilizes matrices for the inputs and the weights, as well as a step function to determine the outcome would be used with the ingredients as inputs and their weights based on the dosages. https://iu.instructure.com/files/180292661/download?download$_frd = 1$

3 Third-Party Libraries and Technologies

If you intend to use third-party tools or technologies, please explain the following for each technology:

1. What technology will you be using?
   (a) SciPy
   (b) MySQL
   (c) PyQt
2. What will it be used for / how will it assist you in your project?
   (a) SciPy - Will allow us to store the inputs and weights as matrices very easily. Similarly it will allow us to offload computation of the dotproducts, summations, and evaluations for our step function to built in methods of the library
   (b) MySQL - Allows us to store and create our training and test data
   (c) PyQt - Allows to create a GUI for our AI so that it is easier to use and more aesthetically pleasing to look at.
3. How will you demonstrate your knowledge of the topic area despite off-loading work to the third-party technology?
   (a) SciPy - understanding how to properly use these computations will show that we fully understand the model and the algorithm
   (b) MySQL - Inputting proper examples and utilizing the data will show that we know how to train our model
   (c) PyQt - Having a GUI does not off-load any work related to the model or it's training.

List this for **all** non-standard libraries you will use. For example, the first item for many Python developers might be numpy, and the first item for many Javascript developers might be jquery. You may always opt to use more third-party tools later by presenting the proposal modification request form to your mentors at one of your check-ins.

4 Project Goals

In this section, please list the specific action items that you intend to complete by the end of the project. Include a range of reach (A-range), target (B-range), and safe (C-range) goals. Each set of goals should build on the previous set. This section will serve as a rubric used to assign a majority of your overall project grade, so be as specific as possible. You may use a bulleted format. This section should be no longer than 1 page single-spaced.

4.1 C-range Goals

1. Create a model that can classify a dietary supplement correctly 50 percent of the time
2. Create a GUI that allows us to input the list of ingredients and the dosages and displays the models output.

4.2 B-range Goals

1. Create a model that can classify a dietary supplement correctly 80 percent of the time.
2. Create a GUI that allows us to input the list of ingredients and the dosages and displays the models output.

4.3 A-range Goals

1. Create a model that can classify a dietary supplement correctly 95 percent of the time.
2. Create a GUI that pulls the ingredients and the dosages from a photo displays the models output

Timeline

Please delineate the major milestones of your project (no milestone should take more than a week to accomplish). The milestones should have accompanying descriptions of everything they entail.

Determine Final Proposal and Regular Meeting Times - 11/06

Consider all the important features structure of our Step-Function - 115

First implementation of Model(at least 50 percent accuracy) and Training and Test data set-up - 11/22

Model optimizations(at least 80 percent accuracy), and final paper draft typed - 11/29

Poster created - 12/05

GUI implemented - 12/13

Model and GUI optimizations - 12/18
Then, for each milestone, specify when you will have it completed (specific date). Additionally, make it clear which milestones you will have completed by each check-in date.

Acknowledgement

Instructor Mentor 1 _____ Signature _____

Instructor Mentor 2 _____ Signature _____

Team Member 1 _____ Signature _____

Team Member 2 _____ Signature _____

Team Member 3 _____ Signature _____