



Nutrition Nuts

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- **Problem Statement:**How do we help those who want to have a healthy lifestyle but aren't sure on how to change their diet?
- **Goal:** The goal of this project is to provide end users with an easy to use tool that can help them plan meals and have a healthy diet.
- **How?** Users will input foods and the app will recommend complementary foods that would make a balanced meal. The meal would meet or exceed the reference daily intakes (RDI) for all nutrients.

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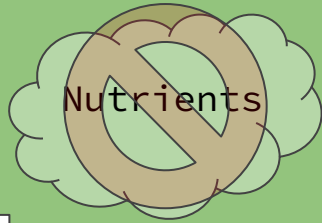
Final
Result

Data Gathering

- Main Data Source: USDA National Nutrient Database for Standard Reference, Release 28(2015)
- Additional Data Sources:
 - Reference Daily Intakes provided by the U.S. Food and Drug Administration
 - National Health and Nutrition Examination Survey Dietary Recall Data



Data Cleaning



Nutrients



Baby Food



Spices

All Foods
& Nutrients

- Filled all blank fields with a value of '0'.
- Removed all unnecessary nutrient columns.
- Removed baby food and spices.



Methods

- Popularity
Index/Loading
- EDA
- Scaling/PCA
- k-Means
- Hierarchical Clustering
- Optimization



Popularity Index/Loading, EDA, Scaling/PCA

- Assigned popularity index to all food items
- Performed Scaling then PCA on the foods with their nutrients based on their common household measure.
- Fifteen components were required to explain 90% of the variance.

Clustering

- Using **K-means and Hierarchical clustering** on raw data did not give good results.
- Using **USDA-supplied food groups as macroclusters**, we created microclusters within them using k-Means and data adjusted for serving size.
- There are 22 main clusters and **145 microclusters**.

Optimization

- **Goal:** give meals consisting of popular foods while ensuring all **22 nutrient features** satisfy the RDI.
- Locate the microcluster that corresponds to the user input.
- Identify **2 or 3 additional microclusters**.
- Propose the meal with the most popular foods within these clusters.
- User can select alternative foods from the same clusters.

Final Result

Desktop Application

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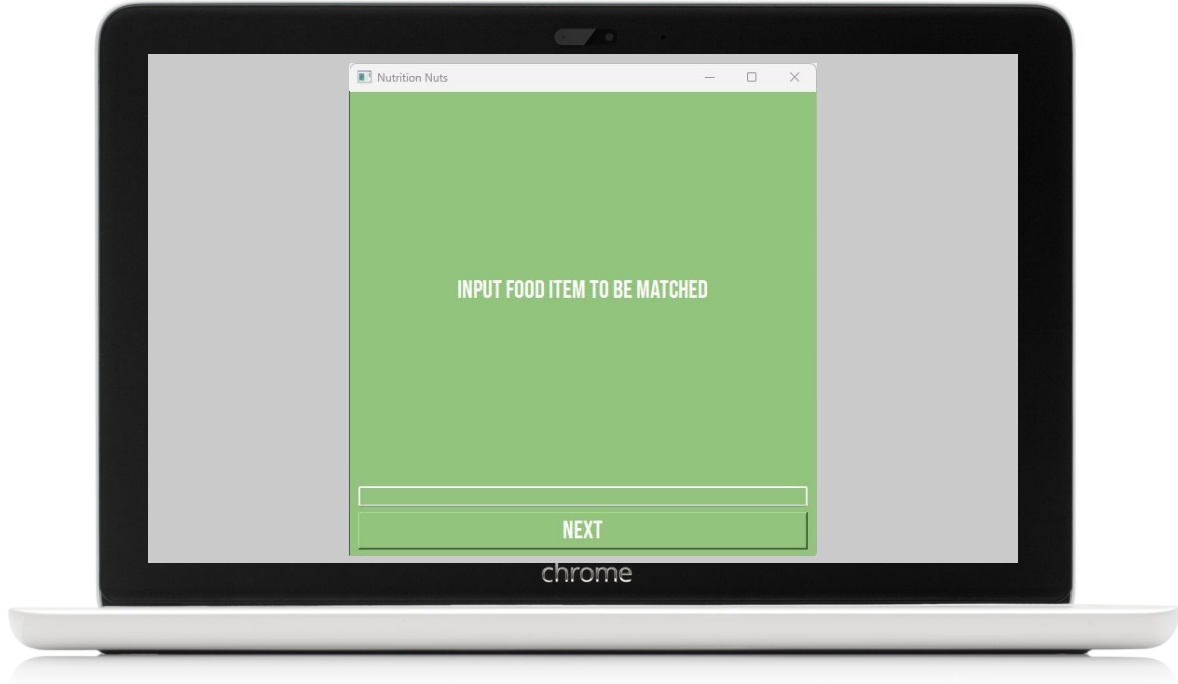
The Product



Desktop Application

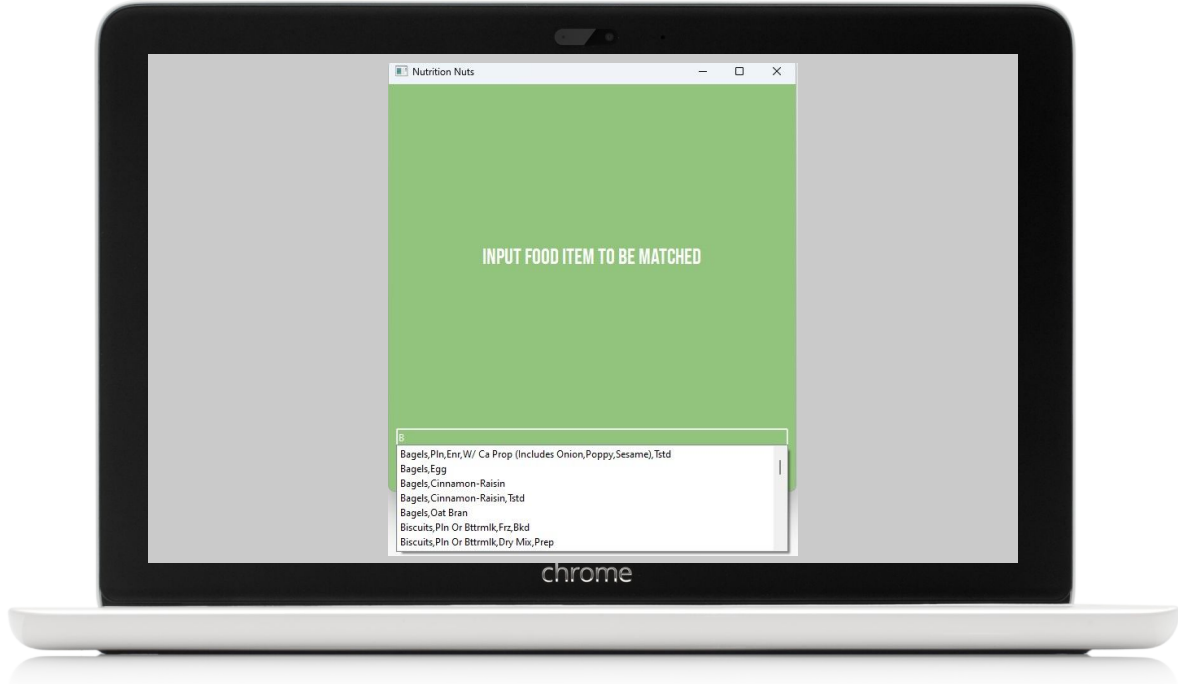
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The Product



Desktop Application

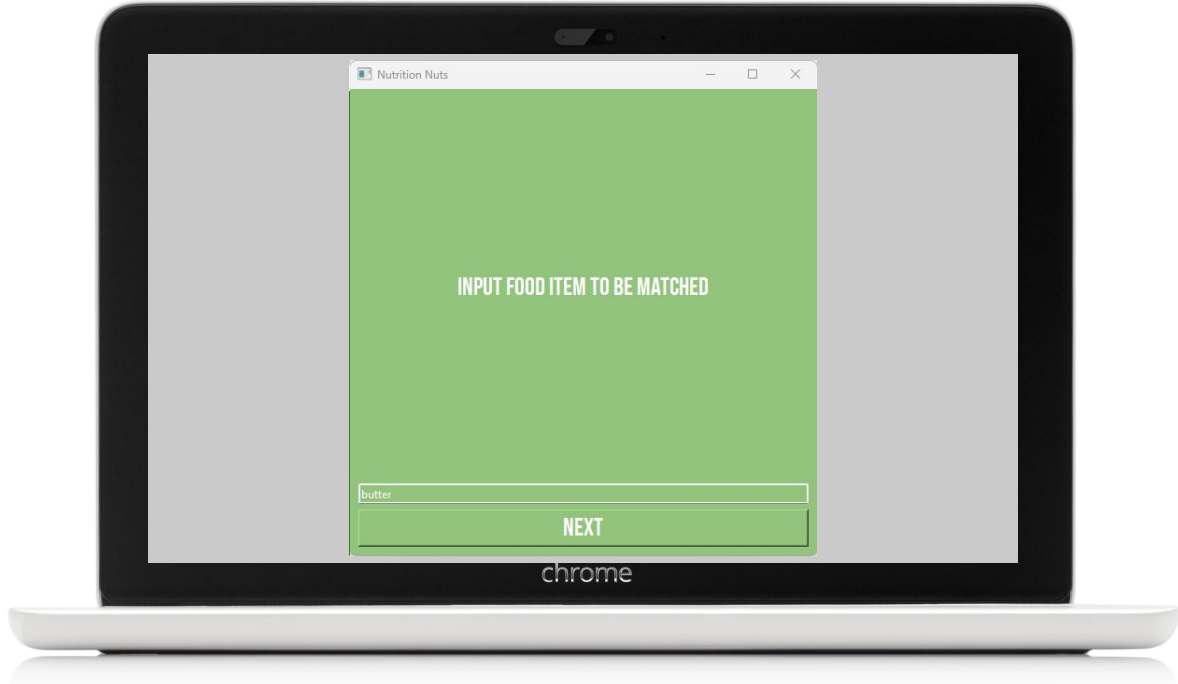
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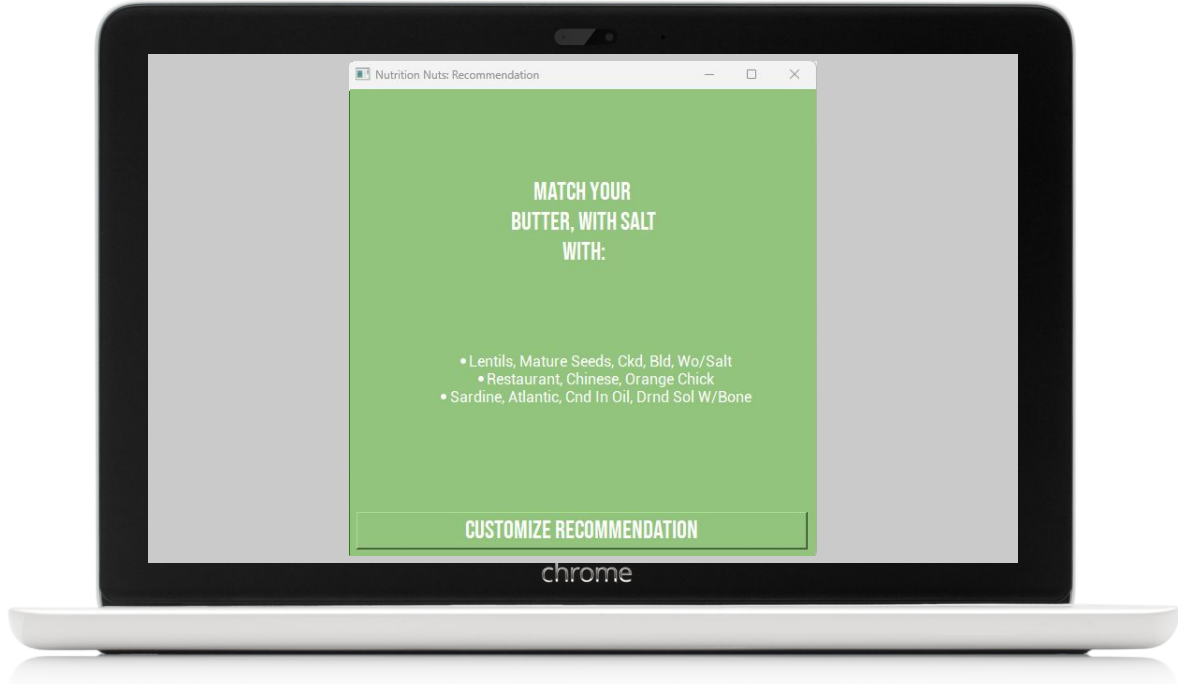
The Product



Desktop Application

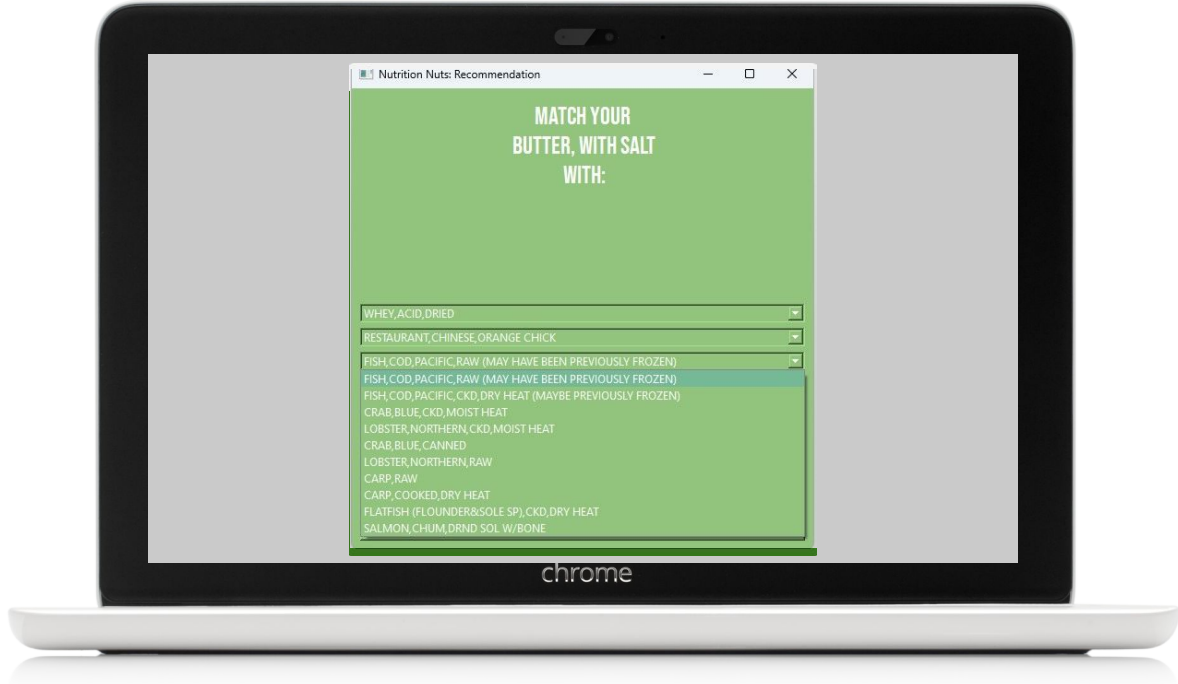
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The Product



Desktop Application

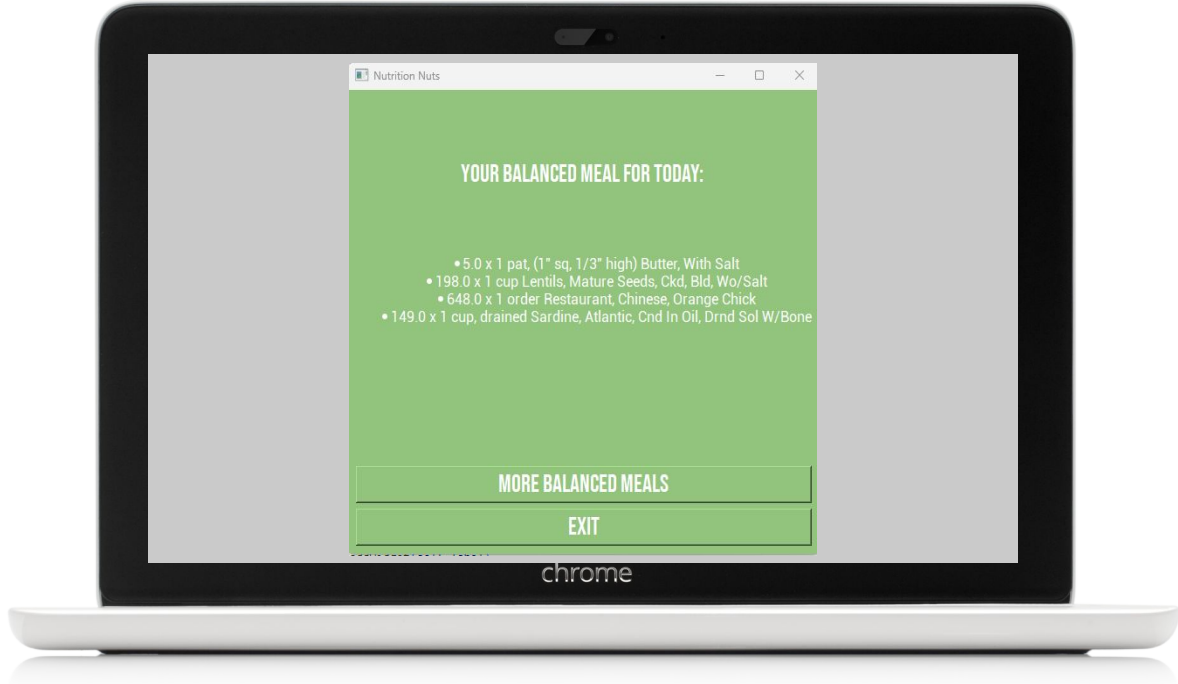
The Product



Desktop Application

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The Product



Summary

- The Nutrition Nuts application allows individuals to achieve a well-balanced meal by allowing them to select their desired main food item and complementing it with 2 or 3 other items from diverse clusters.
- This approach ensures a combination of **variability, accessibility, and overall balance in their meal choices.**



Future Work

- Take into account **additional factors for the suggestions**, such as age, dietary preferences (e.g., veganism), and any specific foods to avoid due to allergies or intolerances.
- Allow users to input foods that are **not currently in the database** and make the program learn the nutrient information from the available data and incorporate it to make more accurate suggestions.

End