Unified Grocery App

Project Proposal

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Table of Contents

Executive Summary

According to a recent study, over 40% of all food in the US is wasted without ever being eaten (Feeding America, 2023). This is coupled with the fact that many Americans say they are unable to or dislike cooking and prefer eating out at restaurants instead. Unfortunately, dining out as a chronic habit can lead to severe health issues such as high cholesterol and even heart disease (Smith, 2018). Thus, there is a need to address these economic, environmental, and public health issues by encouraging individuals to cook at home more often and waste fewer ingredients. The primary goal of this software will be to make at-home cooking easier and more accessible. To accomplish this, we will focus on creating a "virtual fridge" for each of our clients, such that the database knows what and how many ingredients are in the user's fridge at a given time. With this knowledge, the virtual fridge will also be able to recommend recipes based on the current ingredients in the fridge—this will be the app's core functionality. Each solution to the problem of food waste has its advantages and disadvantages and our solution, the Unified Grocery App, aims to combine and improve upon the features which make an effective food waste prevention app while simultaneously removing redundant, niche, and ineffective features. The virtual fridge can also incorporate expiration date information, favored recipes, and difficulty level. Additionally, we can work on enhancing data input into the virtual fridge with text-recognition algorithms that can scan a receipt and input data. A manual data entry method will also be available. Lastly, if there is still time, we can work on a grocery store price comparison that will make it easier for our users to purchase ingredients at the best possible price. Stores located in a specified radius will be compared for the user, rating them on the price and quality of the needed ingredients for the desired recipe. Currently, our target audience is 20-40 year old individuals (millennials) who wish to cook at home more often. Our goal is to make this process easier for

them by recommending recipes that will not require them to buy (many) additional ingredients.

All in all, the Unified Grocery App will improve upon its competitors by providing solutions to

their downfalls and building upon their successes on a model which does not charge the user

monthly with the ability to evolve with additional features in the future.

Introduction

Problem

Each year in the United States, over 119 billion pounds of food is wasted (Feeding America, 2023). This figure amounts to nearly 40% of all food purchased annually (New Hampshire Public Radio, 2016). Clearly, there is an agricultural crisis at hand if nearly half of all grown food is simply thrown away without being eaten. Growing food also takes water, fertilizer, labor, and entire ecosystems that are likely costing the economy billions of dollars as well. Now while there are many reasons for this absurd amount of food waste, the largest culprits are restaurants and individuals throwing food away once it reaches the expiration date.

Food Waste Sector Percentages

Quick-Service Restaurants 15%
Full-Service Restaurants 22%
Institutional 11%
Grocery Stores 2%
Industrial 3%
Residential 47%

Source: Food Waste Reduction Alliance, "Best Practices & Emerging Solutions Toolkit", Spring 2014

Fig 1. A diagram showing the breakdown of food waste sectors. Residential (individual) and restaurants make up the large majority of food waste contribution in the United States. From Baker, 2022

Thus, if ingredients could be better utilized in more diverse recipes before they deteriorate, a significant amount of food can be saved instead of being sent to landfills. Another contributor is the fact that many individuals "overshop" at grocery stores, leaving many ingredients to rot in their refrigerators and pantries. In fact, more than ⅓ of Americans report that they usually or always throw out food past the expiration date, and over 84% of Americans occasionally do the same (Harvey, 2021). This is in turn related to the epidemic of culinarily-illiterate Americans, where only 10% of Americans in a recent Harvard Business School study professed a love of cooking, while the other 90% were ambivalent or opposed to it (Martin, 2017). A similar study corroborates this finding, where 56% of Americans were found to botch "easy" recipes such as pancakes, eggs, pasta, and mac and cheese (Melore, 2022).
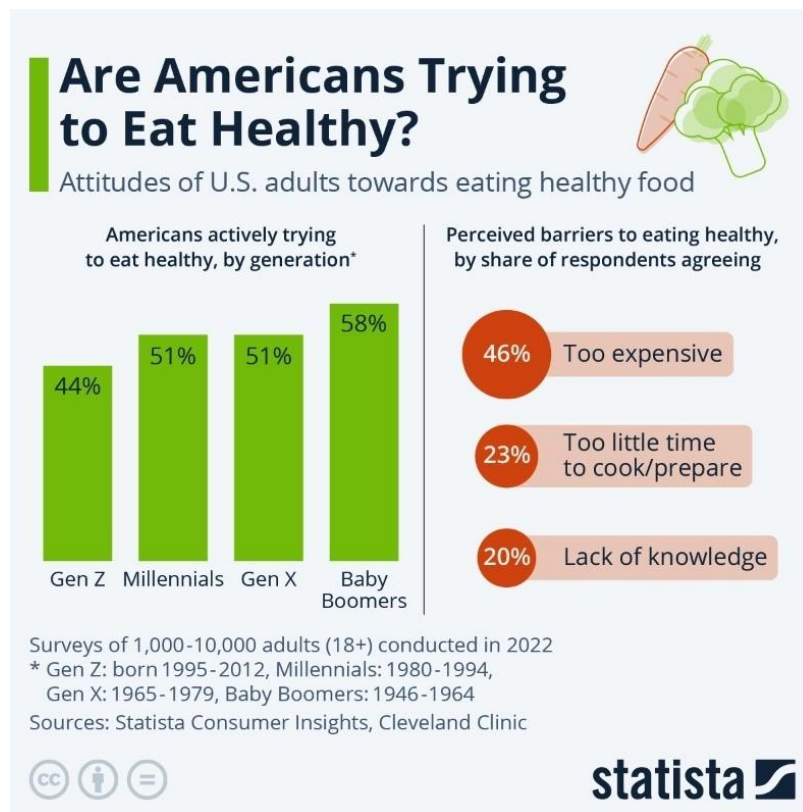

Fig 2. An infographic showing the generational decline in healthy eating interest and common barriers to this goal. From Buchholz, 2023.

Due to these troubles with at-home cooking, many Americans have flocked to eat at restaurants and fast-food catering options. In fact, a study finds that over 163 million Americans eat out at least once a week, which amounts to 64% of the entire US population (Industry News, 2020). Unfortunately though, a chronic habit of eating out is not healthy as many scientific studies have found. Possible health consequences include weight gain due to increasing portion sizes, sleep pattern irregularities, high cholesterol and sodium levels, increased risk of heart disease, and much more (Smith, 2018). Thus, this issue is multi-pronged, affecting consumer habits, economic and environmental waste, and even physical health. A solution is therefore necessary to alleviate these problems by promoting healthier food consumption habits.

Audience

Currently, the target audience for the Unified Grocery App is 20-40 year old individuals (millennials) who wish to cook at home more often and prevent food waste. The goal of the Unified Grocery App is to make this process easier for them by recommending recipes that will not require them to buy (many) additional ingredients. The Unified Grocery App will appeal to millennials who want to stop eating out (millennials eat out the most of any generation), but do not have the time to go out of their way to learn new recipes and go food shopping frequently (Okumus et al., 2021). When millennials use the Unified Grocery App, they will be cooking at home more, eating out less, and preventing food waste.

Competition

Upon inspection into the foray of ingredient saving and food saving mobile apps/websites, three main competitors to this Unified Grocery App appear: Supercook

(https://www.supercook.com/), Bigoven (https://www.bigoven.com/), and MyFridgeFood (https://myfridgefood.com/). Each solution to the problem of food waste has its own advantages and disadvantages and our solution, the Unified Grocery App, aims to combine and improve upon the features which make an effective food waste prevention app while simultaneously removing redundant, niche, and ineffective features.

The first competitor, Supercook, is an app and a website that is a search engine for recipes. Supercook allows the user to search for ingredients the user has at home and will provide recipes that can be made with the available ingredients. Recipes are broken down into categories to help the user decide what they want to eat. In addition, Supercook is available in many languages. Some flaws seen in Supercook are the lack of ingredients which the app recognizes (it only recognizes 100 ingredients per category) and how much of each ingredient the user has. The Unified Grocery App will improve upon Supercook by allowing the user to input as many ingredients as they can and in whatever units they want into the virtual fridge. The Unified Grocery App will also provide specific meal recommendations based on user preference on meal and cuisine types.

Bigoven, the second competitor, is also a website and an app which acts in the same capacity as Supercook while adding the functionality of ingredient units, a virtual fridge, and grocery/recipe wish lists. The main downfall of Bigoven is that it requires a $2.99 fee per month to access many of its features. In order for the app to cater to the user's recipe preferences, this fee must be paid. The Unified Grocery App will improve upon Bigoven by implementing its virtual fridge and recipe recommendation model without charging a monthly fee. In addition, with ample time, the Unified Grocery App will implement additional features on top of what Bigoven has to offer such as possible expiration date tracking and receipt scanning.

The third and final competitor is MyFridgeFood, an app and a website that when given the ingredients a user has at home, recommends recipes. The main downfall of the app is that it has a very limited number of possible ingredients to choose from, has a very poorly designed UI, does not allow for the amount of each ingredient to be inputted as a parameter, and does not take user preference into account. The Unified Grocery App will improve upon this design by implementing a better UI, keeping track of the amounts of each ingredient the user has, and taking user preferences into account when recommending recipes.

All in all, the Unified Grocery App will improve upon its competitors by providing solutions to their downfalls and building upon their successes on a model which does not charge the user monthly with the ability to evolve with additional features in the future.

Specifications

Features

At its core, our application will be a mobile app that can recommend recipes for users based on items in their fridge. A detailed list of base-level features is below:

1. An interface that allows users to manually enter ingredients and food items in their fridge/pantry.

2. An interface to display the items the user has listed as being in their fridge/pantry.

3. An interface that displays recipe recommendations based on the number of matching ingredients as in the fridge/pantry.

Any features added to the app other than the ones listed above will be considered additional and are not needed for this project to be considered a success. Our application will also require a list of recipes and their corresponding ingredients. This data can be sourced from

online recipe websites or recipe databases (such as the following:

https://github.com/cweber/cookbook/blob/master/recipes.csv). The application will also require

the contents of the virtual fridge, which can be manually entered by the user. Our technology will

depend on a reliable database (Firebase, Postgres, etc.) and being able to perform CRUD (create,

read, update, delete) functions on it. It will also need an IDE for testing and development, which

will likely be Xcode (the coding language will be Swift). Additionally, Google has an image-to-

text recognition package for Swift that can be borrowed

(https://developers.google.com/ml-kit/vision/text-recognition/ios). The above methods show a

feasible way to implement the ideas of the app because the tools required do not have much of a

learning curve and are attainable in the timeframe of this project.

Feedback

To acquire feedback from our target audience, we will have several testing stages where

once the app is published on the app store, we can ask family members/friends to pilot the app

for us or even advertise the app to new clients at grocery stores/other public places. We will

encourage users to leave App Store ratings through in-app push notifications and also send out

Google Form surveys for individuals that are in a designated testing group.

Potential Future Additions

Some additional features that could be implemented into the app are listed below:

- Expiration Dates: As mentioned in the problem statement, a significant contributor to

   food waste are items that are thrown away as the expiration date hits without ever being

   eaten. We hope to alleviate this issue by tracking expiration dates and placing a higher

priority on recipes with ingredients that are about to expire.

- Receipt Scanning: In order to streamline the process of adding ingredients to a user's virtual fridge, we hope to implement a receipt scanning system that automatically adds all items from a shopping trip to the user's fridge in one go. These items can then be backfilled with information (such as expiration dates) later on.

- Grocery Store Price Comparison: To better assist customers with buying groceries, we would also like to implement a system that compares the price of many ingredients at different stores, and chooses the store with the cheapest prices overall. This will save customers the time of having to travel to multiple different grocery stores.

References

Baker, L. (2022, March 14). The Facts About Food Waste. *NMRA*.

https://www.nmrestaurants.org/the-facts-about-food-waste/

Feeding America. (2023). *Food Waste in America*.

https://www.feedingamerica.org/our-work/reduce-food-waste

Harvey, C. (2021, October 27). The expiration dates on our food could be contributing to a huge

environmental problem. *Washington Post*.

https://www.washingtonpost.com/news/energy-environment/wp/2016/05/19/the-surprisin

g-factor-thats-causing-people-to-throw-away-perfectly-good-food/

Industry News. (2020, February 26). *Study: 163 Million People Dine Out at Least Once a Week*.

QSR Magazine.

https://www.qsrmagazine.com/news/study-163-million-people-dine-out-least-once-week

Katharina Buchholz. (2023, March 1). *Charted: Here's how Americans are approaching healthy*

eating. World Economic Forum.

https://www.weforum.org/agenda/2023/03/health-food-us/

Martin, E. (2017, September 27). *90% of Americans don't like to cook—And it's costing them*

thousands each year. CNBC.

https://www.cnbc.com/2017/09/27/how-much-americans-waste-on-dining-out.html

Melore, C. (2022, January 10). *Half of Americans struggle cooking easy-to-make dishes—Like*

pancakes and pasta! Study Finds.

https://studyfinds.org/bad-cooking-easy-meals-pancakes-pasta/

New Hampshire Public Radio. (2016, November 15). *U.S. Consumers Waste Around 40% of*

Food, Thanks to Overshopping and Freshness Labels.

https://www.nhpr.org/the-exchange/2016-11-15/u-s-consumers-waste-around-40-of-food-

thanks-to-overshopping-and-freshness-labels

Okumus, B., Ozturk, A. B., & Bilgihan, A. (2021). Generation Y's dining out behavior.

International Hospitality Review, 35(1), 41–56.

https://doi.org/10.1108/IHR-07-2020-0023

Smith, H. (2018, July 1). *What regularly dining out does to your body*. Insider.

https://www.insider.com/what-dining-out-does-to-your-body-2018-6