**MacroEats - A tool that helps track and maintain macronutrient goals ordering from chain restaurants**

Fidelia Nawar, Soo Sung, Mariah Meehan, Sichen Zhong, Pony Ameri

#### **WHY**

#### **Problem Statement**

* Describe the problem you are solving.
  + We want to help users stay within their nutritional goals even when eating out at chain or fast food restaurants.
  + We would like to provide restaurant and meals recommendations based on user inputs of nutrition goal(s) (calories, protein, carbs, fat), their location and their budget.
* Why is this a compelling and impactful problem to solve? Why is this a big opportunity?
  + Our product can save meal choosing and prep time for our customers while meeting nutrition needs and budget based on their macro goals.
  + Offers a cheaper alternative to hiring a nutritionist since many low-income individuals would not have access to consulting one
* What assumptions are you making about the problem / opportunity? (these assumptions would directly influence the key elements and features you would build in the minimal viable product (MVP)
  + Our target users will have access to a smart phone and/or the internet to use our product
    - We will build a webpage for low-income people who don’t have access to a smart phone
  + The user will input their own metrics (age, height, weight, exercise frequency) in order to assist in calculating the appropriate macros for their body
  + If the user doesn’t input their nutrition/macro goals for the day, the recommender system will predict meals based on baseline macro goals for that user’s body weight/type/age etc.
  + The target user will be comfortable with the recommendation from fast/chain restaurants
  + Users can access the restaurant from the recommendation. The datasource we intend to use has 154 fast food restaurants, which might not be available in all areas in the U.S.. Thus location information would be required to provide better experience for the users.

**Impact and market opportunity**

* How would you go about quantifying impact, market opportunity for this particular problem you are trying to solve by building a data science product?
  + Tracking macronutrients is essential because by managing the amount of protein, carbs, and fats consumed, people can focus on food composition and overall nutritional value rather than just low-calorie options. Consumers also use macro-tracking apps for various reasons, including helping manage medical conditions, enhancing athletic performance, building muscle, encouraging better food choices, or losing weight.
  + This problem is critical to solve because it allows for a more seamless experience for health-conscious individuals to eat out more healthily and keep them within their goals. This product would save users time so they don't have to continuously formulate their meal prep ideas and cook the food while tracking their macros to know what they can and can't eat.
  + Eating out can be very difficult for people trying to meet specific nutritional goals or follow a particular diet. This app would help those individuals maintain a social lifestyle while also following a diet or meeting their nutritional goals/needs. We will start with chain restaurants whose data is readily available online and hopefully as time goes on more restaurants would join in order to make dieting and tracking nutrition easier and more convenient.
* MarketSize (How big is this market, based on your research?)
  + Based on market research, the intended audience for this product is young adults since they are usually the group of people who work out more and also eat out often. According to a medical Expenditure Panel survey, about 59.7% of young adults reported exercising at least three times a week for half an hour or more. And then according to a different study from Ladders, about 54% of young adults eat out. In addition, since this product would incorporate macronutrient tracking features similar to MyFitnessPal, it's important to consider the demographics of those who use it to gauge a similar target audience. myfitnesspal.com's audience is 48.03% male and 51.97% female, and the largest age group of visitors is 25 - 34-year-olds, with over 20 million visits each month. Based on these numbers, we have a reasonably large target audience of young adults aged 18-34 who both eat out and invest time into working out that would be interested in using this app to track their macronutrients.

**Target Customer and user/customer discovery**

Who is the primary customer/user? What is the use case? What are key assumptions you are making about the primary customer/ user and use case?

* Identify targeted user/customer segments for the MVP.
  1. People who care about the daily nutritional needs and want to track nutrition while eating out.
  2. People who are subject to a particular budget and still want to meet their nutrition goals through recommendations.
  3. Smartphone users
  4. People who have access to the internet
* Define the primary use case validated by this target user/customer.
  1. Meal/Restaurant recommendation system and nutrition tracker for our target user
* What might be other key assumptions that are important to validate with the target user/customer?
  1. Users have access to the restaurant from the recommendation system and the store will provide the meals from the recommendation. Some menus may be seasonal or retired so some of the recommendations may be outdated or not valid.
  2. Pricing for menus may vary depending on the location of the user. We would like to assume the same baseline pricing for one area and apply to other areas to achieve the budget calculation
* How would you go about validating these additional key assumptions?
  1. Reach out to the brands to make sure we have the menus updated based on their seasonal promotion. Manual edit may be another option if there’s no direct contact with the brands available.
  2. Adding features for users to provide feedback on whether the product recommended is available or not. Then the algorithm can be updated as a self-learning algorithm.
* Who will you contact to conduct initial user research and feedback?
  1. People who already have used the nutrition tracking apps or fitness apps, are tech-savvy and live in an area that has access to a lot of chain restaurants.
* What is the user journey and UI/UX for this data product?
  1. User decides they want to eat out for lunch due to time constraints. They’ve already entered their macro goals for the day and what they ate for breakfast. They also want to keep the meal under $15.
  2. The user opens the app and does a location search of all nearby restaurants that have meal options that meet their goals and budget.
  3. The user picks a restaurant to browse the menu options that the app recommended. They do this for a few restaurants to see various options.
  4. Once the user decides which meal they want, they either go to that restaurant to order the meal or use another ordering app to place their order.
  5. If the meal isn’t available, the user has the option to provide that feedback in the app so that recommendations can be adjusted in the future.
  6. They indicate on the app the meal they chose so the app can continue to keep track of the progress of their macro and budget goals for the day.

**Market Landscape / Competitive Landscape / Existing companies solving the same / similar problem**

Who are the major players and main vendors in the space? What are the existing solutions?

| **Company Name** | **Stage (startup, enterprise)** | **Product / Solution overview** | **Who is the primary customer?** | **Key differentiation vs your proposal (based on your understanding/**  **research)** |
| --- | --- | --- | --- | --- |
| MyFitnessPal | Enterprise | Diet tracking app lets you search food items from the database, scan barcodes, track body weight, etc. | Customers seeking to track their diet | Includes key features for macro tracking, but no way to purchase specific meals from nearby restaurants based on dietary restrictions |
| MyMacros+ | Enterprise | Diet tracking app that lets you eat mindfully by tracking meals, learning about habits, and reaching goals | Customers seeking to track their diet and lose weight | Includes key features for macro tracking, but no way to purchase specific meals from nearby restaurants based on dietary restrictions |
| LifeSum | Enterprise | Digital self-care app that provides customers with meal plans and recipes based on a diet that fits their lifestyle and food preferences | Customers seeking simplified meal plan and nutritious recipes | Does not provide the ability to purchase food items from nearby stores, limits customer to meal plan and pre-planned recipes |
| Nutritionix Track | Enterprise | Fitness tracking app developed and maintained by a team of registered dieticians to work towards customer's health goals | Customers seeking to track their diet | No way to purchase specific meals from nearby restaurants based on dietary restrictions |
| LoseIt! | Enterprise | Weight loss management tool used to track foods | Customers seeking to lose weight | No way to purchase specific meals from nearby restaurants based on dietary restrictions |
| Carb Manager | Enterprise | Weight loss management tool for keto and low-carb diets | Customers on keto/low-carb diet | Limite dietary restrictions to only keto/low-carb does not provide the functionality to purchase meals from nearby restaurants |
| [MyMenu Concierge](https://www.mymenuusa.com/post/how-to-find-restaurants-with-nutrition-facts-near-you) | Seems like an established startup | Helps you pick and customize menu items from various restaurants based on your health and fitness goals | Individuals seeking to follow specific diet guidelines for health or fitness goals | This app also does not provide a way to purchase the meal. |

If you can’t identify existing solutions or similar solutions that solve the problem, please explain why there isn’t an existing solution.

**Relevant readings, market research, white papers, academic research (share title and link)**

* User Perspectives of Diet-Tracking Apps: Reviews Content Analysis and Topic Modeling
  + <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8103297/>
* Controlling Your “App”etite: How Diet and Nutrition-Related Mobile Apps Lead to Behavior Change
  + <https://mhealth.jmir.org/2017/7/e95/>
* Diet and Physical Activity Apps: Perceived Effectiveness by App Users <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4840256/>
* Building an app like ubereats
  + <https://www.uptech.team/blog/app-like-uber-eats>
* Yum-me: a personalized nutrient-based Meal Recommender System
  + <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6242282/>

**WHAT**

**Minimal Viable Product (MVP)**

* What is the minimal viable product that you are building that will specifically test the fundamental assumptions you have about the problem and the value of your solution?
  + What are the main features and why?
    - Nutrition Tracker
    - Meal/Restaurant Recommendation based on Macros left and price limit input
  + What is the value delivered to your user/customer?
    - The value is ease of use and convenience. The product will make tracking macros, reaching fitness goals and finding a healthy meal at a specific budget easy and convenient.
  + What is the key question or questions (max 3) that your target user/customer will be able to answer using your Capstone product?
    - How many macros am I consuming in a day?
    - What are the correct macros and calorie requirements for my body?
    - What meals at restaurants are available for me to eat at in order to meet my nutritional goals while staying within my budget?
* What data science approach would you intend to use for the MVP? (this is NOT UI / UX but technical discussion)
  + Machine learning techniques are required (classification) for building models for recommendation.
  + NLP techniques to classify the items in the dataset to avoid providing recommendations of 5 coffees that meets the nutrition goal and price budget
* How would you potentially test the efficacy of the MVP? When would you start testing?
  + As soon as we have a baseline, we can have the initial users to start testing it.
  + A mock-up UI can be assessed independently to see what type of information the users are willing to provide.

#### What is the key **differentiation** between your MVP and the existing solutions and/or approaches?

The key differentiation is the meal and restaurant recommendations based on a price limit and macro nutrition goal.

#### **Value Proposition** (what value/utility does your project/product provide to your intended users?)

* State the value that your MVP brings to the target customer segment.
  + Personalized, ease of accessibility to discover meals from nearby restaurants that fit within the individual’s macro goals and budget
* The value proposition should indicate why your solution is better and/or more differentiated.
  + The app does not simply provide macro tracking functionality, but also recommends them meals using data from nearby restaurants
  + The user is also able to filter by budget to find meals within a certain price range

#### **Mission Statement**

#### **\*\*Access convenient, affordable and personalized nutrition-balanced meal recommendations on the go at your fingertips.**

#### **HOW**

#### **Data sets**

* What datasets do you intend to use?
  + Fast food restaurants nutrition facts (scraping may needed): <https://fastfoodnutrition.org/fast-food-restaurants>
  + Backup fast food nutrition facts : <https://www.openintro.org/data/index.php?data=fastfood>
  + Google place api: <https://developers.google.com/maps/documentation/places/web-service/overview>
    - This can be used to filter out the available restaurant from our database to avoid providing the unavailable restaurant to our user
* Are the datasets public?
  + Published web page data, scraping may be needed. We should contact the webpage owner if the affiliation is required. The back-up dataset is public and available with less input.
  + Google place api is a service provided by google maps platform that can be used with a rate.
* What are the datasets attributes / metadata that could make the exploratory data analysis easier / harder?
  + Instead of using all 154 restaurant’s data, the most popular 16 restaurants data can be representative as the most popular restaurants are mostly available in all areas of the U.S.

#### **Project Management**

* What is the role of each member (who will do what specifically)?
* Who is the project manager and chief facilitator (and tie breaker)
  + Mariah
* Who is the resident SME?
  + Fidelia Nawar
* Who is the product manager?
  + Fidelia Nawar
* Who is the lead on infrastructure and data engineering?
  + Sichen Zhong
* Who is the lead on EDA?
  + Sichen Zhong
* Who is the lead on model evaluation?
  + Pony Ameri
* Who is the lead machine learning engineer?
  + Pony Ameri
* Who is the lead MVP application developer?
  + Soo Sung
* Who are the backups to key roles?

|  | Role and responsibilities (immediate) | Role and responsibilities (long term) / Alternate or additional role / pair |
| --- | --- | --- |
| Fidelia Nawar | Product Manager/Resident SME | Help identify key features/functionality of product, update project based on scope/time/resource constraints / ML Engineering |
| Pony Ameri | Model Evaluation  Machine Learning Engineer | Help with Data Engineering |
| Mariah Meehan | Project Manager/Chief Facilitator | Data Engineering/EDA |
| Soo Sung | MVP Application dev | Can help with machine learning and project management |
| Sichen Zhong | Data engineering and EDA | Can help with model validation and machine learning  Can help organize meeting and record the todo list |

\*\*Some teams have used pairing principles to assign two members of the team to main tasks.

* What are the strengths and weaknesses of each team member?

|  | Strengths | Weaknesses |
| --- | --- | --- |
| Fidelia Nawar | Coding (Python/C++/JavaScript/SQL), Project management, Front/backend development, creating presentations, UI design | Cloud infrastructure setup, ML pipeline development |
| Pony Ameri | Data Engineering, Machine Learning, Data Visualization | Devops |
| Mariah Meehan | Data analytics, Data Cleaning/manipulation, data visualization, Python | App development, cloud infrastructure setup |
| Soo Sung | Documentation, front end web dev (JS, HTML, CSS), EDA, data visualization, Cloud, Tensorflow | Data engineering, backend development, ML pipeline development |
| Sichen Zhong | Time management/Data analytics/Data engineering/Data visualization | App development/Ethical and privacy related topics |

* Submit the Team Process Agreement.

#### **Technical Approach and Planning**

* What methodologies would you use for initial data exploratory analysis to ensure your datasets are sufficient and meaningful?
  + Outlier detection (Check if it is normal distribution)
  + Check for statistical insights to get details on various statistical data like Mean, Standard Deviation, Median, Max Value, Min Value
  + Checking null entries
  + Autocorrelation plots to check for randomness in data
  + Multivariate analysis to check if there are existing relationships between more than two variables
* What data science algorithms are you intending to develop and build for the project? What challenges do you potentially foresee?
  + Classification: K-fold cross-validation
    - Disadvantages: Not great at recommending new items.
  + Collaborative filtering: find similar users or items and multiple ways to calculate rating based on ratings of similar users. Measure the accuracy of your predictions through error calculation techniques such as the Root Mean Square Error (RMSE), in which we predict ratings for a test dataset of user-item pairs whose rating values are already known.
    - Disadvantage: calculated only on the basis of the rating (explicit or implicit) a user gives to an item.
  + Natural Language Processing
* What help do you need?
  + How to build a recommendation system?
  + How to check if the manually created label is valid or not?

Note: there is a weekly team check in at the beginning of each class starting week 4 and during non-presentation weeks. The team check-in is usually 3-5 min. Please cover: major milestone(s) achieved in the past week, major milestones to be achieved this week. One key learning to share with the class. And help needed.