



Food Places Recommendation System Based on Emotions for KSU College Student

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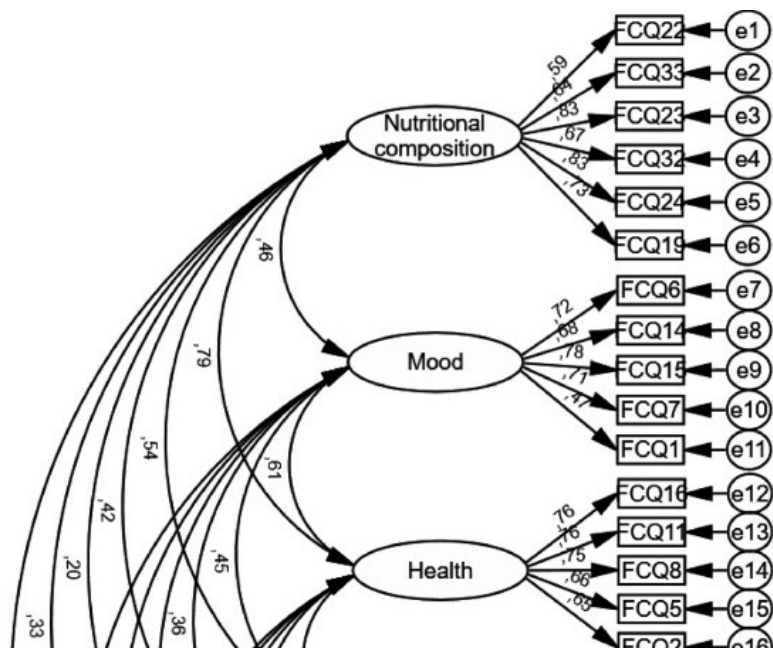
Introduction



Motivations for this project

Nowadays, there are many college students face issues like depression due to having bad eating habits or lack of healthy eating. According to Fobes, there are various reasons related to their depression in their diet, such as being too busy or unable to afford good food. In 2018, a Nutrients study surveyed 692 undergraduate and graduate students and showed that food insecurity significantly affected GPA. Food-insecure students had an average GPA of 3.33 out of 4.0, while food-secure students had an average GPA of 3.51.

Recognizing the importance of a high connection of nutritional composition, mood and health, especially for college students, our team came up with the idea of linking college student emotions to the food options by using recommendation system.



Connection between nutritional composition-mood-health



Real Applications

We aim to provide a solution to college student emotions, such as depression, stress, laziness, and happiness by building recommendation systems to help boost their moods, and improve their food experiences. Additionally, we recommend places that are connected with those food options in our system, which are nearby campus for individual college students.

Project Details

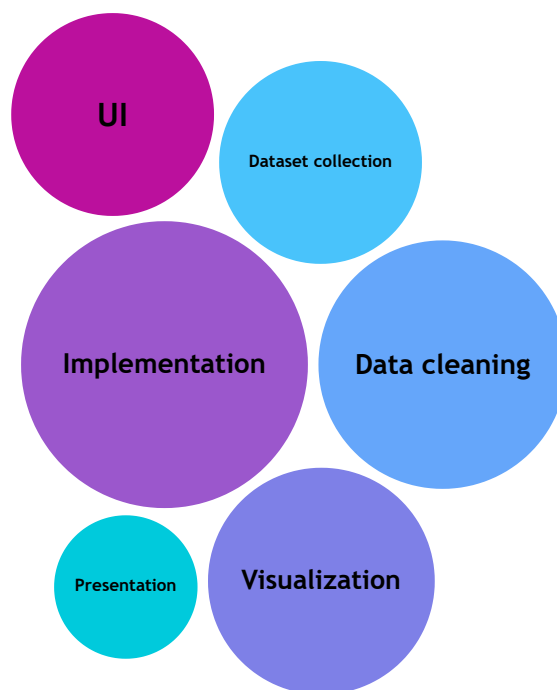
Description We will develop a web based interface along with our recommendation system that allows KSU students to select a set of emotions(icon) such as happy, stress, bored, tired, etc..., based on their current mood. The recommendation will personalize food options by analyzing the

relationship between specific attributes in the dataset, connecting certain foods with particular moods. Additionally, the system will provide suggestions for places(restaurant/supermarket/grocery) that fit food options near campus. For the places, we will only consider those nearby campus with high rating reviews as top picks for students.

Challenges There will be several challenges that our project will be dealing with. We would have to decide which is the most suitable algorithm to implement and integrate into our recommendation system. Based on our dataset, we have limitations on food options that involve emotions. Moreover, it's challenging to find specific locations using Yelp and Supermarket dataset. Specifically, those are very large dataset, so we will need to learn how to implement those techniques in code in an efficient manner.

Workload Distribution

- *Writing report paper, presentation, and video demo*
- *Find and collect the dataset*
- *Data cleaning and processing*
- *Visualizing: plot, graph, chart,...*
- *Implement recommendation system algorithm for project using techniques from class and google*
- *UI web application for better illustration of what the real application would look like*



Background

Software Tools



Python libraries/framework such as scikit-learn, numpy, pandas to read the dataset, matplotlib to plotting the dataset, HTML+CSS React Js for interface, and Github to deploy our application

Hardware



Personal laptops and computers that can store and download large dataset

Skills

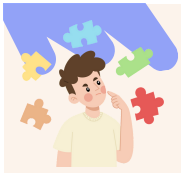


Python, Jupyter Notebook, TensorFlow, Data Mining and Algorithm Knowledge, Web Programming

Problem Definition

Formal definition

The problem can be defined as



- Let $F = \{f_1, f_2, f_3, \dots, f_n\}$ be the set of food items mentioned in survey dataset
- Let $E = \{e_1, e_2, e_3, \dots, e_n\}$ be the set of emotions like 'happy', 'stress', etc.
- Let $R = \{r_1, r_2, r_3, \dots, r_n\}$ be the set of location of restaurants nearby campus
- Let $M = \{m_1, m_2, m_3, \dots, m_n\}$ be the set of location of supermarket nearby campus restaurant
- Use the given map: $E \rightarrow P(F)$ where each emotions in E connect to top 5 of foods in F that already connected in dataset
- Learn how to map: $F \rightarrow P(R)$, $F \rightarrow P(M)$ that maps foods to relevant restaurant/supermarket
- Optimize to only close by campus and high rating score reviews ($>3.9-4$)
- Our goal is to optimize these connections to provide the best food recommendations for a given emotion, and related restaurant suggestions.

Demo example:

Given dataset:

$E_1 = \{\text{sadness, stress, cold weather, not feeling well}\}$

$F_1 = \{\text{chocolate, pasta, soup, chips, popcorn}\}$

$E_2 = \{\text{stress, anger, sadness}\}$

$F_2 = \{\text{mac and cheese, chocolate, pasta}\}$

$R_1 = \{\text{cuisine}(\text{cheeseburger, pasta, soda, chocolate}), \text{location}(\text{longitude, latitude}), \text{rating}()\}$

$M_1 = \{\text{food_item}(\text{veggie, mac and cheese, pasta, soup, chocolate}), \text{location}(\text{longitude, latitude})\}$

Food outcome:

$\text{Mood}(\text{stress}) = \{\text{chocolate, pasta}\}$

$\text{Mood}(\text{sadness}) = \{\text{mac and cheese, soup}\}$

Connect food and places outcome:

$\text{Food}(\{\text{chocolate, pasta}\}) = \{R_1, M_1\}$

$\text{Food}(\{\text{mac and cheese, soup}\}) = \{M_1\}$

Places with location nearby campus and high rating outcome:

$\text{Location}(\{R_1, M_1\}) = \{(\text{kent_longitude, kent_latitude}), (\text{rating} > 3.9)\}$



Challenges of tackling the problem

Dataset problems

- The **'food_choices'** dataset we have is a survey conducted in college, so it may not cover all possible foods-emotions combinations. Most of the foods in the survey are snacks and considered unhealthy, so it becomes quite challenging to identify good foods that are associated with cuisine of a restaurant and supermarkets.
- Cleaning and processing the datasets is also complicated because we only need necessary attributes (**'comfort_food_reasons'**, **'comfort_food'**) and change labels to Emotion and Food Options.
- Reading a very large dataset from yelp, specially **'yelp_review.json'** that is over 4gb, is also challenging

Algorithm selection

- We must decide on the algorithms that are most suitable to our application. The algorithm must be able to handle the complexity of emotions and the variety of food.
- The biggest challenge in our project is how to implement location-based recommendation. This involves filtering only locations nearby Kent campus and user ratings, and dealing with a potentially large dataset of locations.



General Solution

We could experiment with multiple algorithms such as counting the frequent foods in the dataset that are associated with emotions. This would involve filtering only the top few foods that are linked to particular emotions like an example in the formal definition above.

For the nearby location of the restaurant/market, we could use Yelp and google map API to fetch location dynamically and apply geometrics algorithm of data mining to filtering locations near

campus and prioritizing high rating review places. However, we are unsure about what the specific implementation would look like. Furthermore, to have better optimization in code, we won't use C++. Instead, we will utilize python, jupyter notebook which included various built-in machine learning framework and library for better performance in our project.



References

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