FOOD INSIGHTS AND ANALYSIS BASED RECOMMENDATIONS

Project ID - 21_22-J-058

Project Final Report (Draft)

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Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

Signature of the supervisor Date

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Abstract

Due to the fast life, deciding on what to cook daily has become a difficult task. Because of the evolving fast life people are confined to a set of routine recipes. Hence the knowledge in cooking is deteriorating day by day for this generation. In order to change this sticking to a routine system and to enhance the knowledge in cooking we propose research on food recommendation system.

The main purpose of this research is to provide each user a personalized recipe suggestion. The system will provide recipe based on the users' preferences which includes demographic, cooking knowledge, BMI etc... With the data gathered behalf of the user the recommendation system provides the best food recipe suggestion to try out. Unlike relying on popular recipes this system will allow the user to have the best recipe based on the individual preference.

Key Words – Machine learning models, Demographic filtering, RS system, Text analysis, Sentimental analysis

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1 Introduction

1.1 Background & Literature survey

In the recommendation systems there are three types of techniques are used extensively for filtering.

1. Content Based Filtering (CBF)
2. Collaborating Filtering (CBF)
3. Demographic Filtering (DF)

The content based filtering technique [1] uses similarities in features to make decisions. For instance, text recommendation systems which are used in the newsgroup system uses the words of their texts as features. This content-based recommender learns from the characteristics of the objects that the user has rated, a profile of user interest, known as "itemto-item correlation," and derives the type of user profile. In the collaborative filtering technique uses similarities between users and items simultaneously to make recommendation decisions. The main characteristic of this model is that it allowed generating recommendations based on a combination of ideas from the contributions of many other users. Instead of filtering items by content, make recommendations based on like-minded users' reviews. Finally in demographic filtering it aims to classify the user based on personal characteristics and make recommendations based on demographic classes. For our research demographic filtering technique would be helpful rather than the other two techniques which are CBF and CF because this technique doesn't require collecting complex data like user activities and don't have to suffer from high computational power issues. Adding to that content filtering technique also often suffer from a main problem

Cold start issues – Need bulky data from already created systems in order to provide precise recommendation.

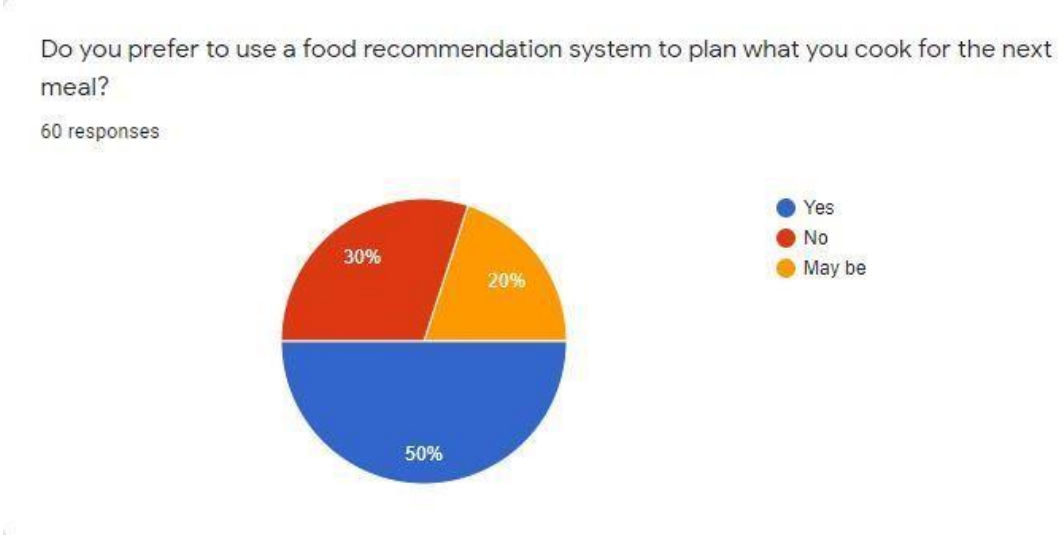

Figure 1:Users Likeliness of Having Guide

From the figure 1, it shows that most people prefer to have a recommendation system to prepare a meal. However, the lack of accuracy in predicting food choices moves people from not relying on the existing food application systems.

The main reason could be the recommended recipe is not compatible to the users' preferences. For instance, recommending a hard recipe for an average cooking skilled user is not applicable. Since the recipe recommendations are unrealistic to the users' cooking expertise, the user might stick to his own way of cooking.

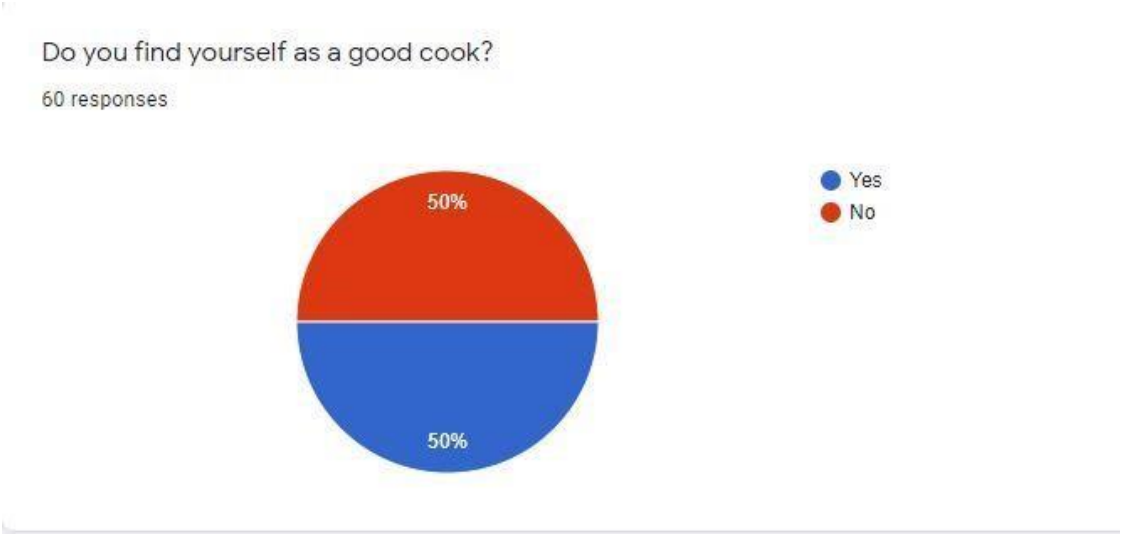

Figure 2: Users Cooking Skill Level

1.2 Research Gap

There are several researches have been conducted in the food recommendation domain in the past [2] [3]. Most of the researches have been conducted either in user preference based recommendation or by predicting the best recipe based on user comments.

However, in the researches where user preference based recommendations have been done, aspect of the users' cooking skill knowledge has been highly neglected. Measuring the cooking skill level and knowledge could allow the system to predict more accurate recommendation to the user. This could be highly beneficial to the end user.

Approach	User Preference Model	Cooking skill level	Sentimental analysis on food recipe data.
Research A [2]		X	X
Research B [3]	X	X	
Proposed Research			

Table 1:Comparison of Former Research and Current Research

Research based on analyzing food Recipe Comments [3] has been conducted and this approach can be more aligned to general perspective than the model based user preference. However, this can be applied as a component to the user based research model. The benefit of having this component is by applying sentimental analysis (LEXICON) the dataset can be rearranged

Sentiment analysis [3] which is a popular technique for text analysis was adapted to the recipe recommendation. For instance, the recipe dataset can be categorized into three subset which can be easy, medium, hard recipes. By segregating the dataset users with the low cooking skill could be directed to the easy recipes. Appling a lexicon-based would be

appropriable in case of avoiding the need to generate a labelled training set. This can eliminate the major disadvantage of relying heavily on machine learning models.

1.3 Research Problem

After extensive research these problems have been found

- User preference based recommendation system highly neglecting the users' domain knowledge when recommending items/content.
- User based recommendation accuracy level could be improved further.
- Dataset of the recipes can be more refined using sentimental analysis.
- Users lack proper awareness when using the recommendation system by providing inaccurate information to the system.

2 Objectives

2.1 Main Objectives

The main objective of this research is to provide accurate food recipe recommendation based on user preferences. The user interface captures the demographic data needed to build the user model and when it's created the best apt recipe according to the model would be recommended. With the app's additional concern focusing on the users' cooking knowledge would make the user to have a good experience from using this app.

2.2 Specific Objectives

According to our research we identify the specific objectives that needed to include in our system. In order to reach the main objectives, the specific objectives that needs to be attained is as follows,

- Creating the user interface to collect user data.
- Analyze the data and build a specific model.
- Segmenting the dataset using sentimental analyses.
- Predicting the best recommendation to the user.

3 Methodology

The proposed system will predict the best recipe recommendation based on user preferences. First, the system will ask the user to provide his/her demographic related data when registering [Rate your cooking skill level: Low, Medium, High, Physical activity…]. With provided data, a personalized user model would be created by using the Demographic Filtering technique. Demographic Filtering (DF) Technique uses the demographic data of a user to determine which recipe may be appropriate for the food recipe recommendation.

Meanwhile, the dataset of the recipe would be refined using sentimental analysis with positively commented recipes having positive score and the negatively commented recipes gets negative score. This will allow the system to redirect the low skilled user to the positively rated recipes and direct the highly skilled user to try all kinds of recipe.

The recipe which was shown to the user would not be shown when he/she's visiting the app next time.

3.1 System Architecture

The specific system architecture is shown in the Figure 1.

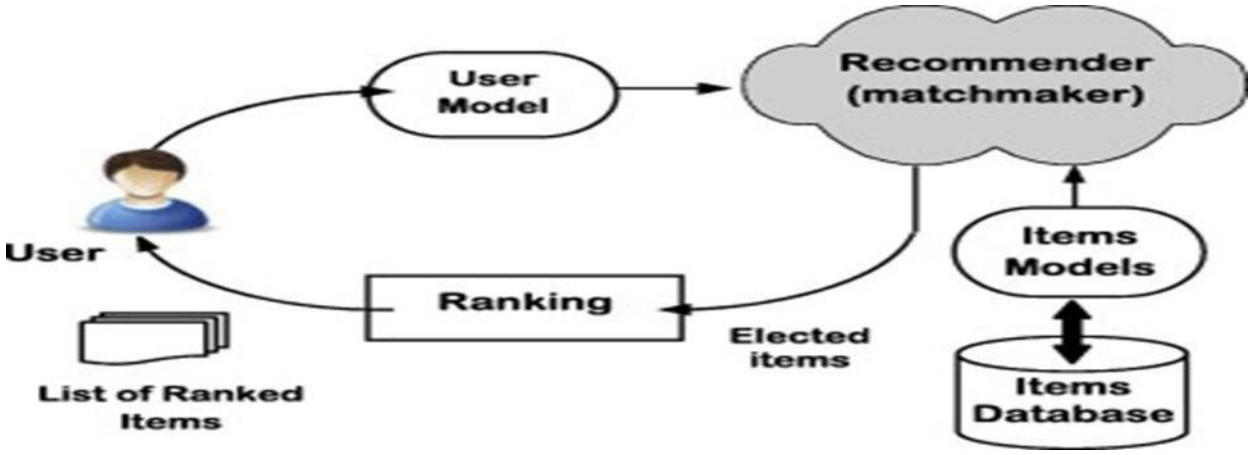

Figure 3: High level Architectural Diagram

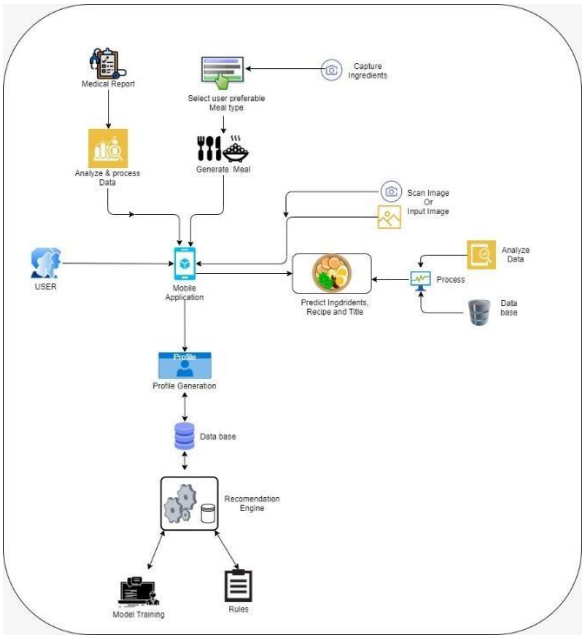

Figure 4: Overall Architectural Diagram

Technologies, techniques to be used

- React Native
- Python
- Firebase
- Demographic filtering
- Lexicon based sentiment analysis.
- ML
- Tensor Flow
- NLP
- Dataset - http://im2recipe.csail.mit.edu/dataset/download/

Non-Functional Requirements.

- Security
- High Accuracy
- Availability
- Usability
- Performance
- Reliability

4. Description of Personal and Facilities

The overall group Description of Personal and Facilities is shown in Table 3.

Student ID	Name	Work Load
IT17111652	Prakash A	Recommending recipe based on user preferences. • Create user profile to represent to capture users' data. • Create user model with the collected user's data. • Segment the dataset. • Predict the best recipe for the users' preference from the refined dataset. • Implement a food history tracker to prevent recommending the same recipe continuously.
IT18234930	T.Abishek	Identify food and predict the ingredients and how it was cooked. Identify the input Image

		• Predict the tittle for the Food • Predict the ingredients from the input image • Predict the cooking instruction (recipe) for the image.
IT18228618	J. Abishek	Recommend recipe based on ingredients for chronically ill person. • Capture ingredients by image processing • Identify and segment ingredients • Analyze user medical condition • Recommend meal plans for user according to their health condition • Guide user pros and cons about what they have picked

Table 2:Description of Personal and Facilities

5 Gantt chart

The Gantt chart of the development process is as depicted in Figure 3.

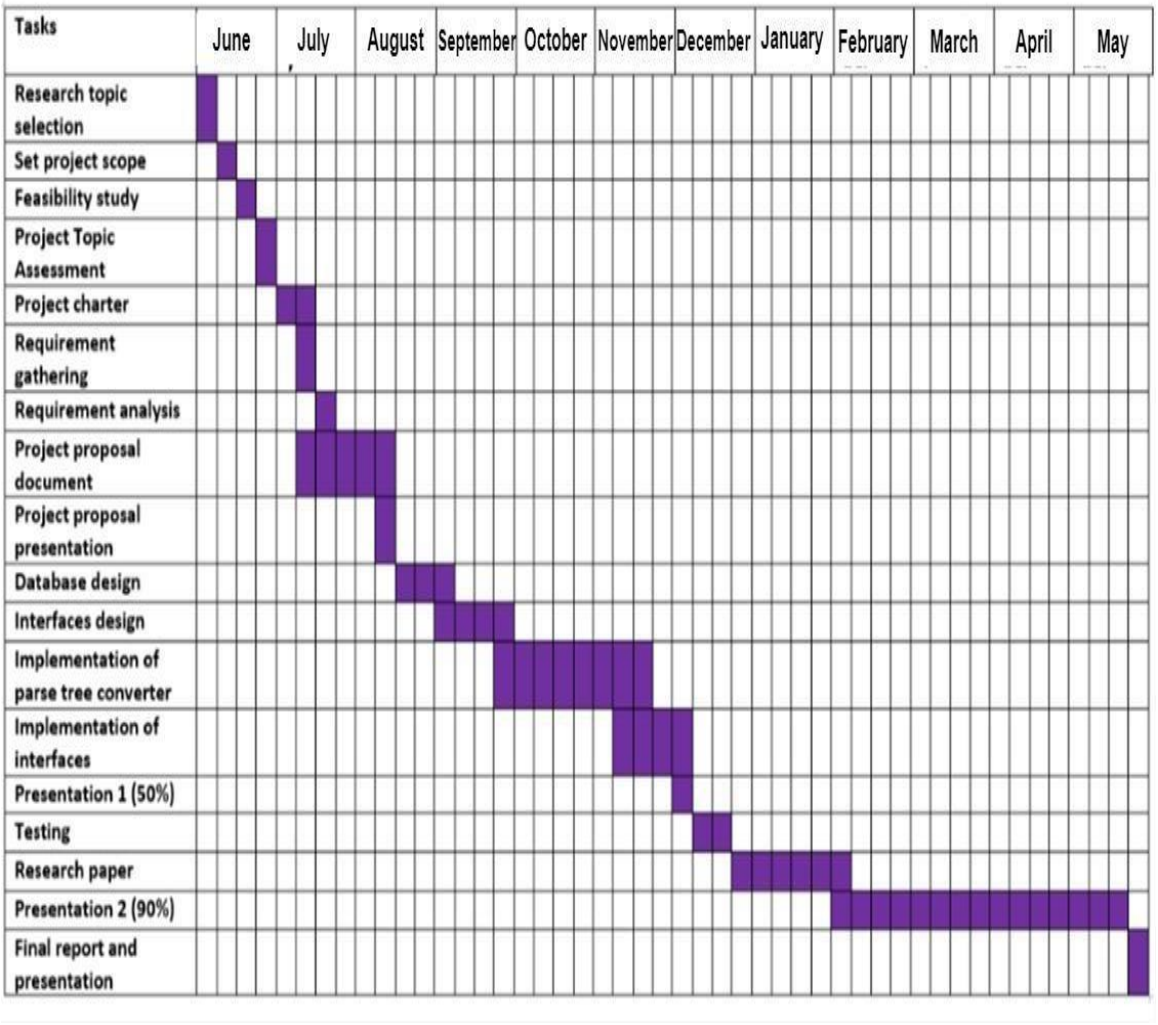

Figure 5: Gantt Chart

6 Budget and Budget Justification

Since the research is a mobile application budget allocation for hardware component is less however, since there are several machine learning model are to be used there is a need to allocate a budget estimation for this app. Therefore, the budget includes hosting expenses and other expenses for internet. In addition, a small amount of budget is allocated for any paid software that are required for the research in future.

Expenditure Description	**Budget**
Web service Hosting cost	**10,000**
Marketing	**10,000**
Other Expenses	**4000**
Total	**24,000**

Table 3: Budget Breakdown Structure

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8 Appendices

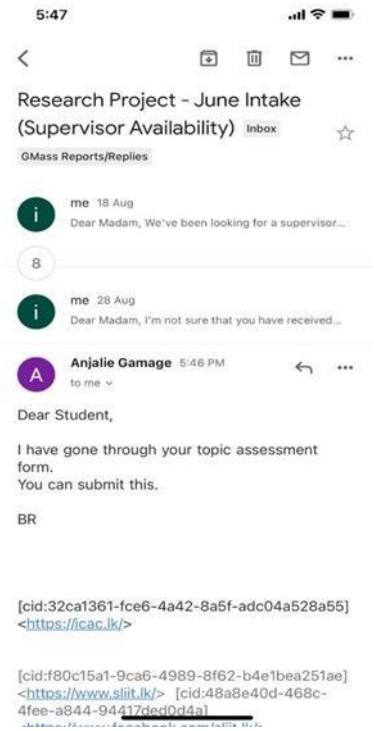

Figure 6: Appendices