"A Personalized Nutrient-Based Meal Recommender System"

A Project Report Submitted to
Rajiv Gandhi Proudyogiki Vishwavidyalaya

Towards Partial Fulfillment for the Award of
Bachelor of Engineering in *Information Technology*

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EXAMINER APPROVAL

The Project entitled ***"A Personalized Nutrient –Based Meal Recommender System "*** submitted by **Saksham doshi, Rahul sariya, Rudraksh Shukla, Rohit Sisodiya and Rishi Prajapati** has been examined and is hereby approved towards partial fulfillment for the award of ***Bachelor of Engineering degree in Information Technology*** discipline, for which it has been submitted. It understood that by this approval the undersigned do not necessarily endorse or approve any statement made, opinion expressed or conclusion drawn therein, but approve the project only for the purpose for which it has been submitted.

(Internal Examiner) **(External Examiner)**

Date: **Date:**

GUIDE RECOMMENDATION

This is to certify that the work embodied in this project entitled "***A Personalized Nutrient –Based Meal Recommender System***" submitted by **Saksham doshi, Rahul sariya, Rudraksh Shukla, Rohit Sisodiya and Rishi Prajapati** a satisfactory account of the bonafide work done under the supervision of ***Dr. Kamal Kumar Sethi***, is recommended towards partial fulfillment for the award of the Bachelor of Engineering (Information Technology) degree by Rajiv Gandhi Proudyogiki Vishwavidhyalaya, Bhopal.

(Project Guide) **(Project Coordinator)**

STUDENTS UNDERTAKING

This is to certify that project entitled ***"A Personalized Nutrient –Based Meal Recommender System"*** has developed by us under the supervision of ***Dr. Kamal Kumar Sethi***. The whole responsibility of work done in this project is ours. The sole intension of this work is only for practical learning and research.

We further declare that to the best of our knowledge, this report does not contain any part of any work which has been submitted for the award of any degree either in this University or in any other University / Deemed University without proper citation and if the same work found then we are liable for explanation to this.

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We express profound gratitude and heartfelt thanks to **Dr Kamal Kumar Sethi**, HOD IT, AITR Indore for his support, suggestion and inspiration for carrying out this project. I am very much thankful to other faculty and staff members of IT Dept, AITR Indore for providing me all support, help and advice during the project. We would be failing in our duty if do not acknowledge the support and guidance received from **Dr S C Sharma**, Director, AITR, Indore whenever needed. We take opportunity to convey my regards to the management of Acropolis Institute, Indore for extending academic and administrative support and providing me all necessary facilities for project to achieve our objectives.

Executive Summary

A Personalized Nutrient –Based Meal Recommender System

This project is submitted to Rajiv Gandhi Proudyogiki Vishwavidhyalaya, Bhopal(MP), India for partial fulfillment of Bachelor of Engineering in Information Technology branch under the sagacious guidance and vigilant supervision of ***Dr. Kamal Kumar Sethi***.

This project is an approach for recommending healthy and nutritional diet by Data mining algorithms like K neighbors and Decision tree, it envisaged personalized meal on the basis of **Nutrient** user prefer, **disease/medical condition** he has or has been through and particular **diet** he/she wants to maintain, recommender system focuses on every individual based on their eating habits and body statistics, system uses an adapted collaborative filtering approach to recommend food based on healthiness and taste ratings of other users.

Key words : KNN, Collaborative filtering

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Chapter 1 .Introduction

In this fast and busy schedule life, people are not giving importance to the quality of food they are eating. They tend to neglect their eating patterns and habits. The fast-food consumption rate is alarmingly high and this consequently has led to the intake of unhealthy food. This leads to various health issues such as obesity, diabetes, an increase in blood pressure etc. Hence it has become very essential for people to have a good balanced nutritional healthy diet. There are many applications which are booming to help people so that they can have control over their diet and hence can reduce weight or they can help them to keep them fit and healthy. Food recommendation challenges the way recommender systems are used, since it requires a strong adaption to the domain specific requirements in order to provide individually valid and practically usable health advice. On one hand, user ratings of food taste may be individually reliable in view of using them in a collaborative filtering approach. On the other hand, the variety of nutritional advice available and the difficulty of knowing all ingredients and nutrients in a given meal make it harder for consumers to judge the health value of their meal. Thus a personalized recommender based on expert knowledge may be necessary to provide good results.

1.1 Background and Motivation

People make decisions related to food every day. They all think about what to eat, where to eat, how much nutritional value this food has, can this make me lose weight, can this food make me healthy and other questions. Recommendation systems help the user to make fast decisions in these complex information spaces. Much of this attention is being paid to diet management systems, which have been replacing traditional paper-and-pen methods. These systems include informative content and services, which persuade users to alter their behavior. Due to the popularity of these diet monitoring facilities, these systems hold a vast amount of user preference information, which could be harnessed to personalize interactive features and to increase engagement with the system and the diet program. One such personalized service, ideally suited to informing diet, is a food recommender. This recommender could exploit the nutritional values of the food to inform its recommendations

1.2 Objective

The goal of application is to provide a platform where users find their food according to their personal preferences and build a behavior of living healthy life.

1.3 Scope of the Project

The application can help people who are diet/health conscious. The application is targeted towards a local audience, for now, as of present it can only be used as a web application that recommends food based on their personal preference.

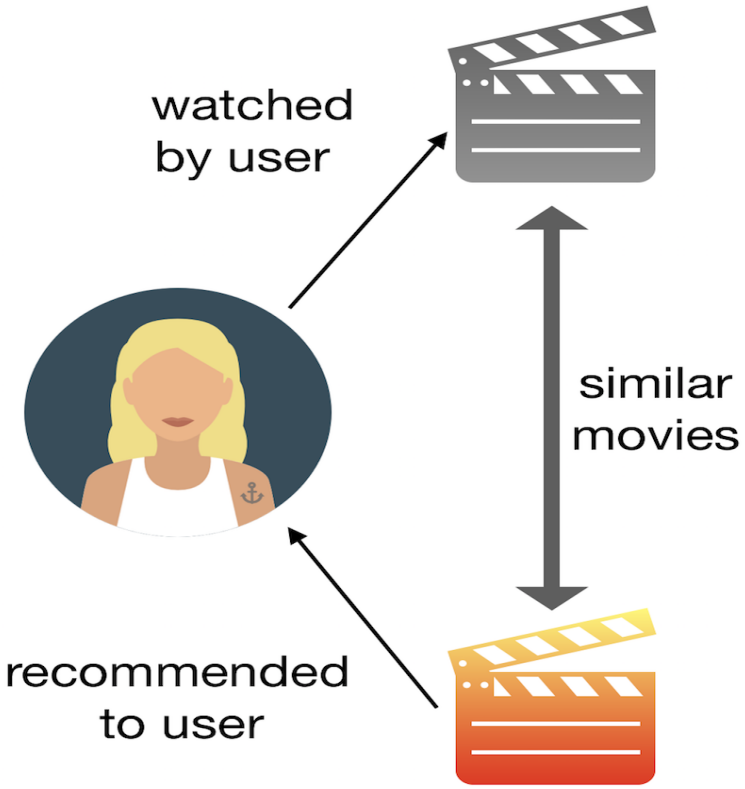
1.4 Report Outline

Preliminary	• Title Page • Supervisor's Recommendation • Letter of Approval • Acknowledgement • Abstract • Table of Contents • List of figures and Tables
Introduction	• Background and Motivation • Objective • Scope
Literature Review	• Food Recommendation System • Content Based Filtering Algorithm
System Development	• Data collection • Data Processing • Algorithm Used
Test	• Implementation and testing
Conclusion	• Successful Recommender

Chapter 2 .Review of Literature

2.1Content based

Content Based Filtering Algorithm: In a content-based recommender system, keywords or attributes are used to describe items. A user profile is built with these attributes. Items are ranked by how closely they match the user attribute profile, and the best matches are recommended. Content-based filtering recommends items based on a comparison between the content of the items and a user profile. The content of each item is represented as a set of descriptors or terms. The user profile is represented with the same terms and built up by analyzing the content of items which have been seen by the u



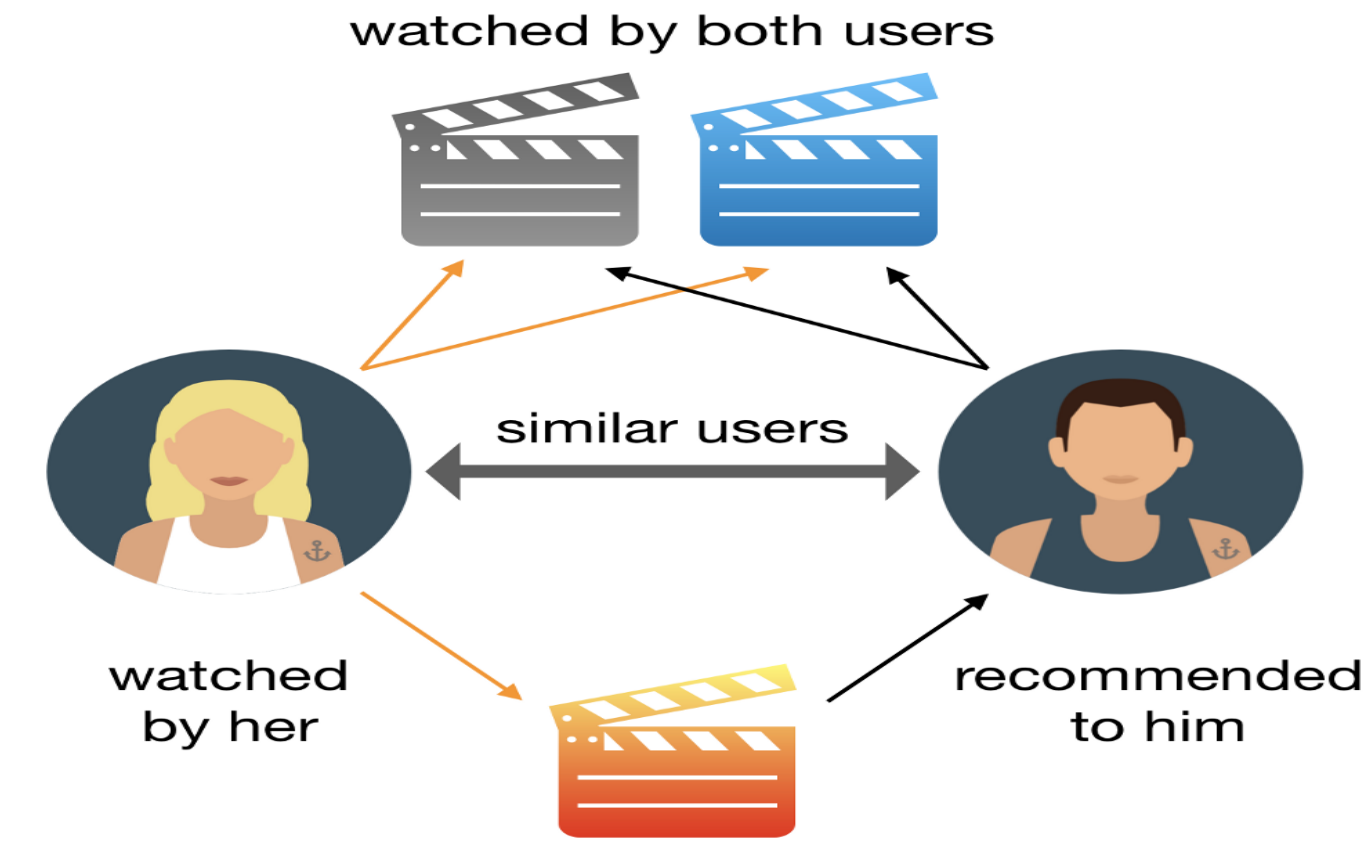
Content-based filtering uses item features to recommend other items similar to what the user likes, based on their previous actions or explicit feedback. The model should recommend items relevant to this user. To do so, you must first pick a similarity metric (for example, dot product). Then, you must set up the system to score each candidate item according to this similarity metric. Note that the recommendations are specific to this user, as the model did not use any information about other users.

2.1.2 **Limitations of content based filtering algorithm**

- Items and attributes must be machine-recognizable
- . Cannot filter items on some assessment of quality, style or viewpoint. Because of lack of consideration of other people's experience, the system cannot make any assessments of a quality, style or viewpoint for the item
- . Absence of personal recommendations. Due to the lack of consideration of other people's experience, recommendations are based on the item's attributes, tags, among others, and, therefore, missing any personality assessment. Food recommendation system using content based filtering algorithm
- No new items to display: The system is unable to give an item surprisingly interesting to a user, but not expected or possibly foreseen by the user. For example, if a food of the same ingredient has been shown, the user probably already knows about the food and, therefore, is not surprised.

2.1 Collaborative filtering

This type of filter is based on users' rates, and it will recommend us movies that we haven't watched yet, but users similar to us have, and like. To determine whether two users are similar or not, this filter considers the movies both of them watched and how they rated them. By looking at the items in common, this type of algorithm will basically predict the rate of a movie for a user who hasn't watched it yet, based on the similar users' rates.



2.2 Feasibility Analysis

The following result was obtained while performing a feasibility analysis:

2.2.1 Operational feasibility

The end users are the clients of the application. They are the ones who search for the food item. The server keeps the records of all food items and attributes associated with it

2.2.2 Technical feasibility

HTML is used to display content in the browser, CSS to make content look user friendly, and JavaScript for making the web page interactive. At the server side, the logic is implemented using python, Django web framework for dynamic web page generation and to display the predicted result in the browser as well as to handle page requests. A server, client, and internet connection are required to function properly

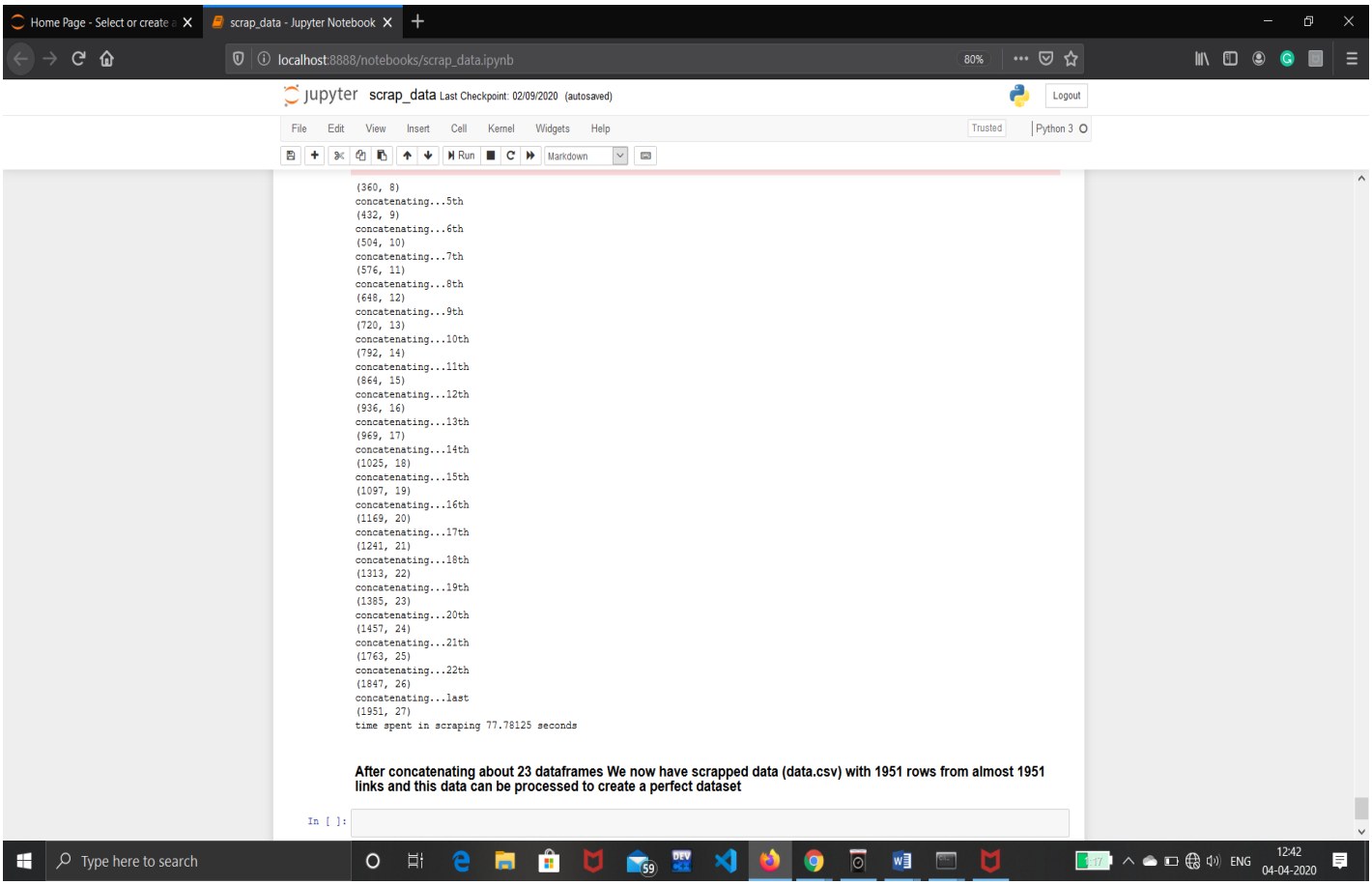
2.2.3 Schedule feasibility

The total estimated time for the development of the application is 1-2 weeks.

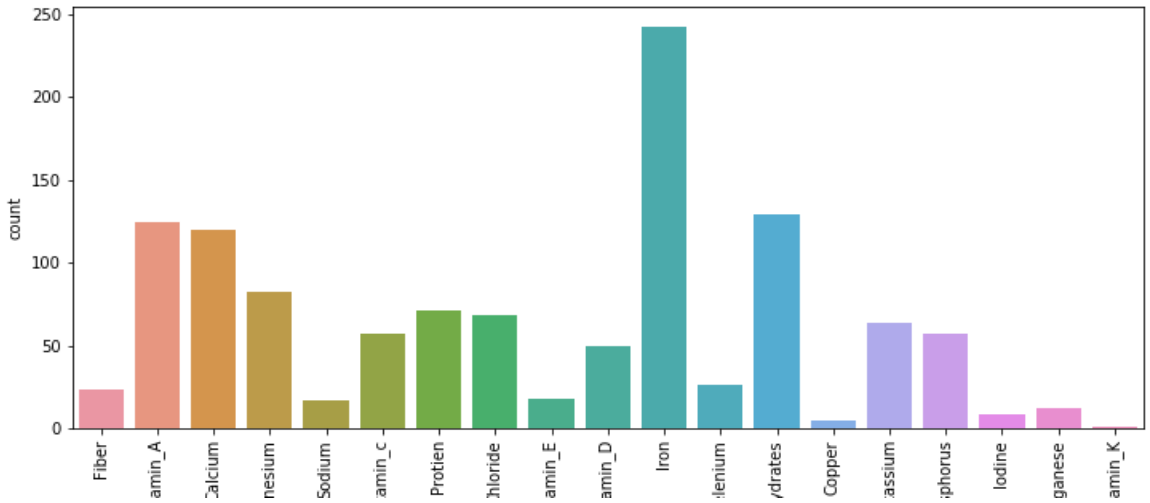
Chapter 3 . System Development

3.1 Data collection

Web scraping : The data for system was collected by scraping



Data Processing – scapped data was processed to create a dataset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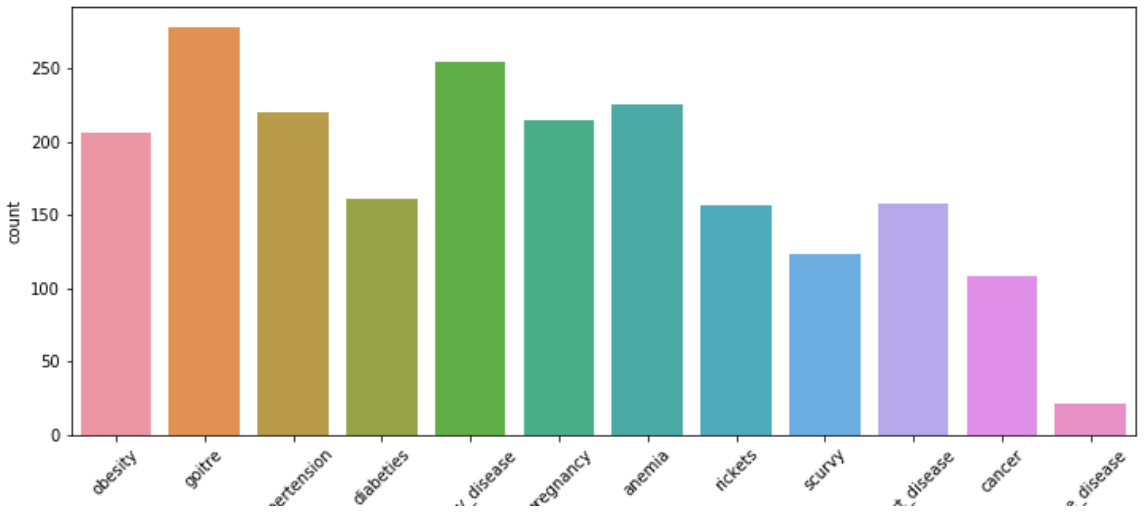
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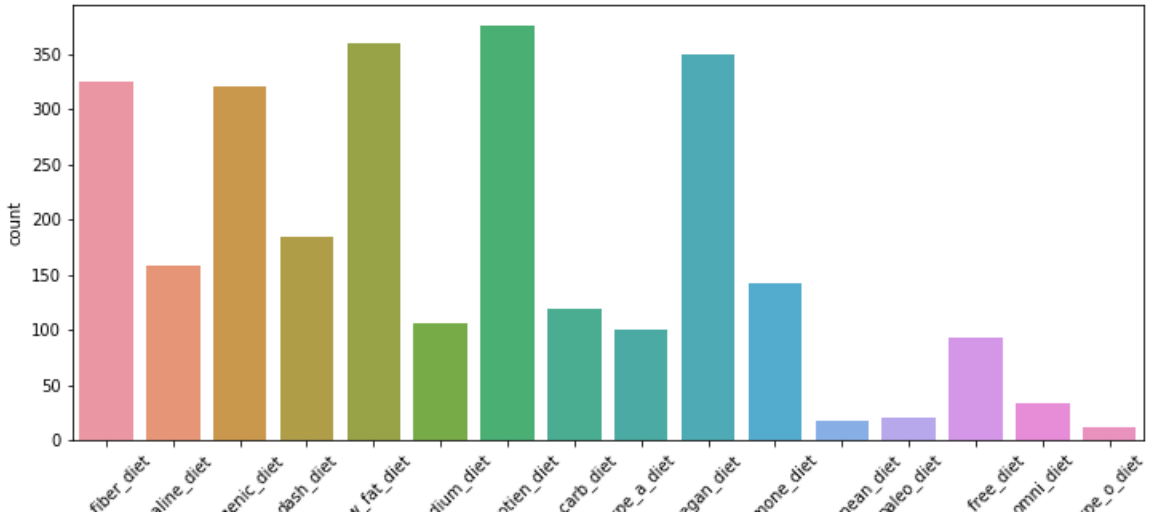
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Final Dataset

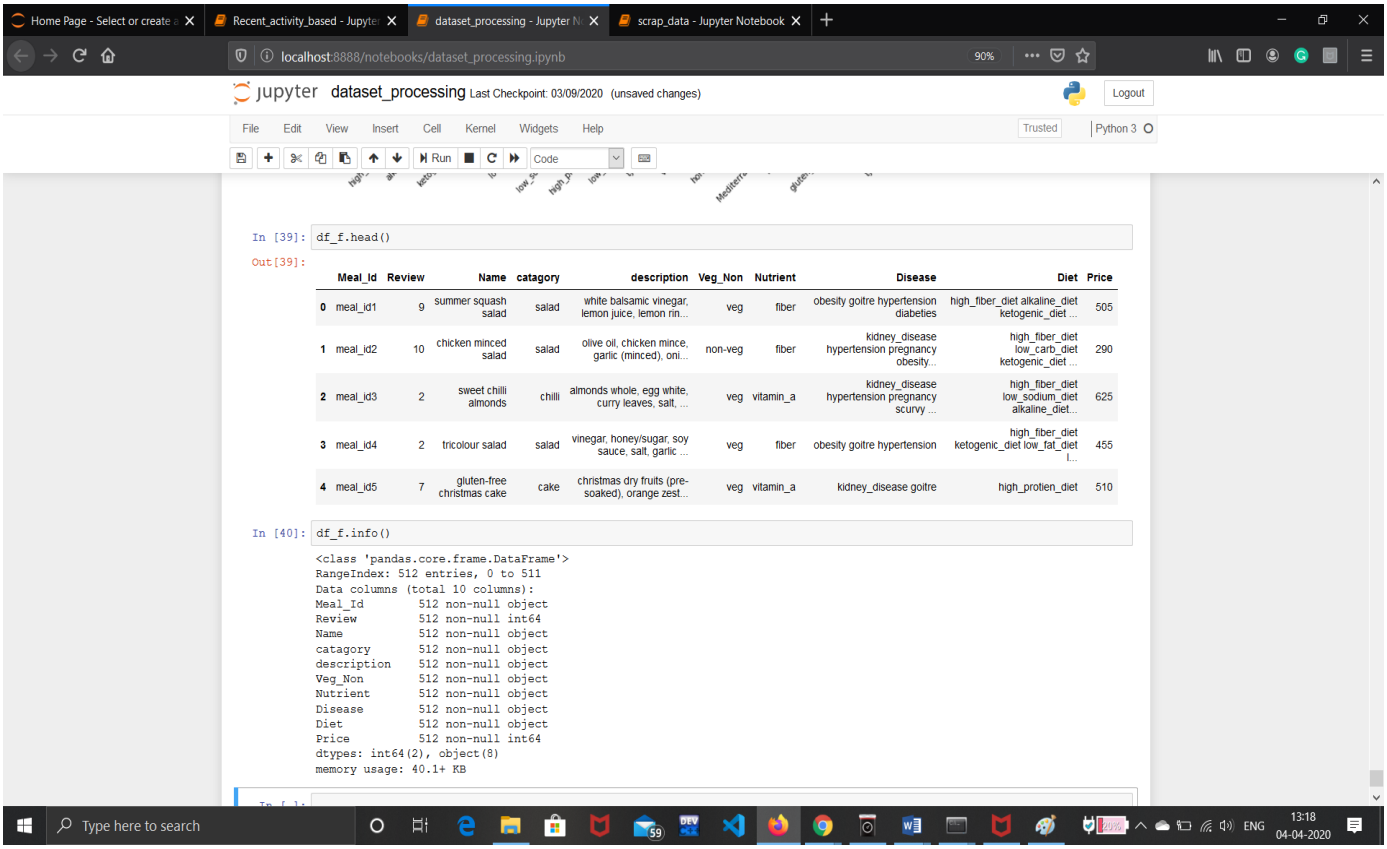
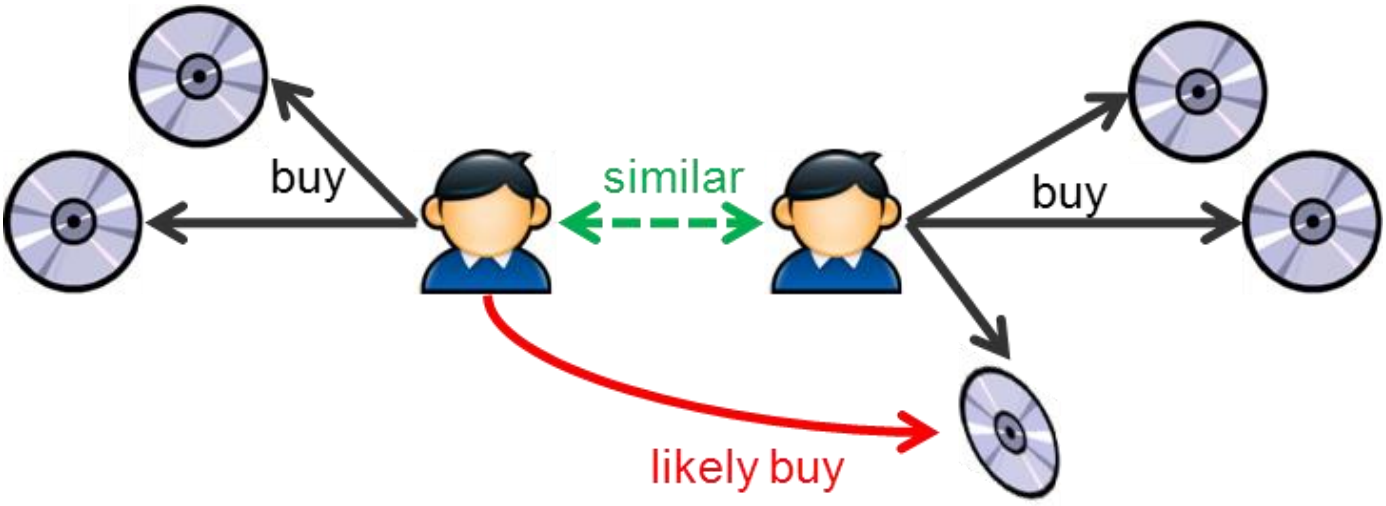


Fig : final Dataset

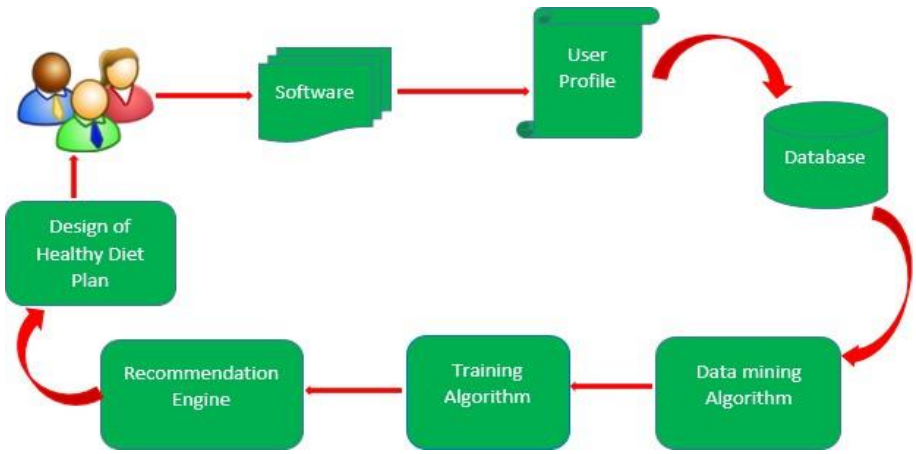
3.2 Algorithms used

Nearest Neighborhood

The standard method of Collaborative Filtering is known as **Nearest Neighborhood** algorithm. There are user-based CF and item-based CF. Let's first look at **User-based CF**. We have an n × m matrix of ratings, with user u_i, i = 1, ...n and item p_j, j=1, …m. Now we want to predict the rating r_{ij} if target user i did not watch/rate an item j. The process is to calculate the similarities between target user i and all other users, select the top X similar users, and take the weighted average of ratings from these X users with similarities as weights.



3.3 Block Diagram



Chapter 4 .Implementation and Testing

For the problem of counting the number of students and vehicles entering the college campus manually, the system is designed in such a way so as to automate the process by placing a camera at the entrance gate so that students, bikes and cars getting inside the college campus can be identified and counted.

4.1 Tools used

The application is based on Django framework , Backend of application is completely based on python and its libraries ,various tools like /jupyter notebook are used to analyze data and dataprocessing while the frontend consist of HTML5, CSS3 and bootstrap4 to develop a good user interface ,for database csv files mysqlite are used.

4.2 Implementation screenshots

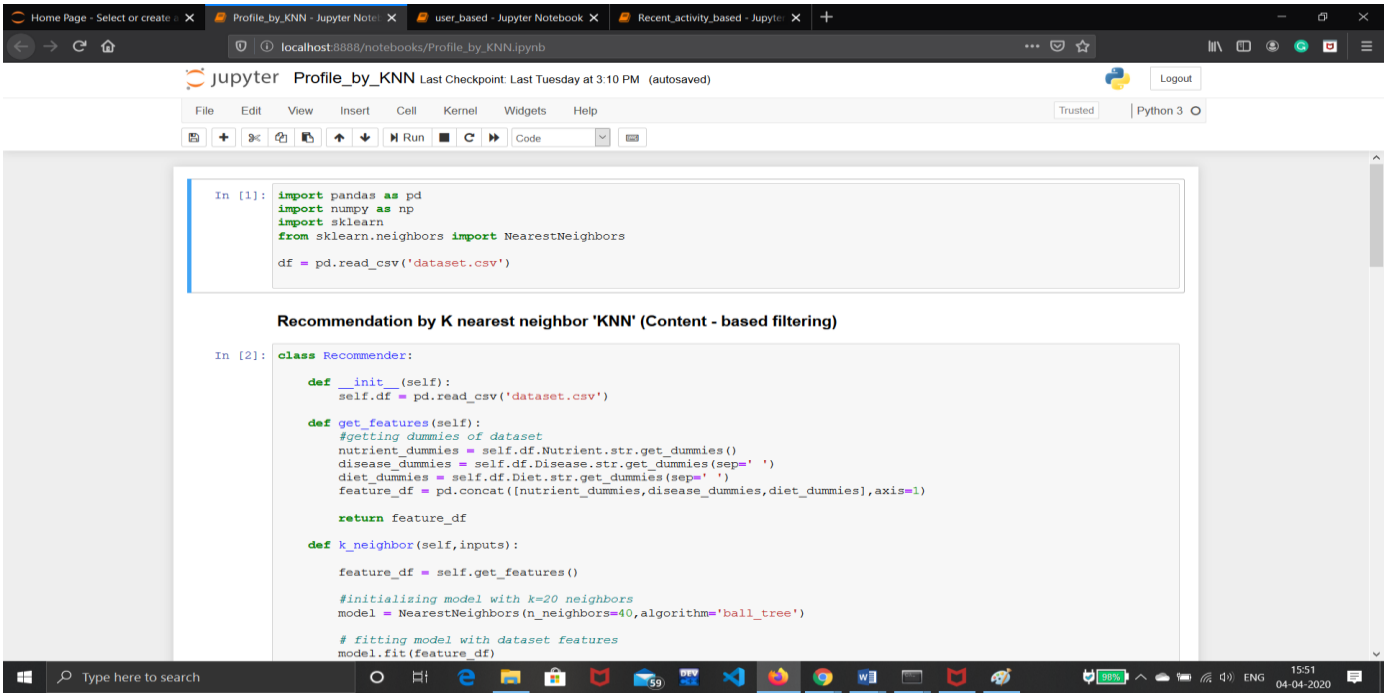


Fig: Initial Profile creation by User preference

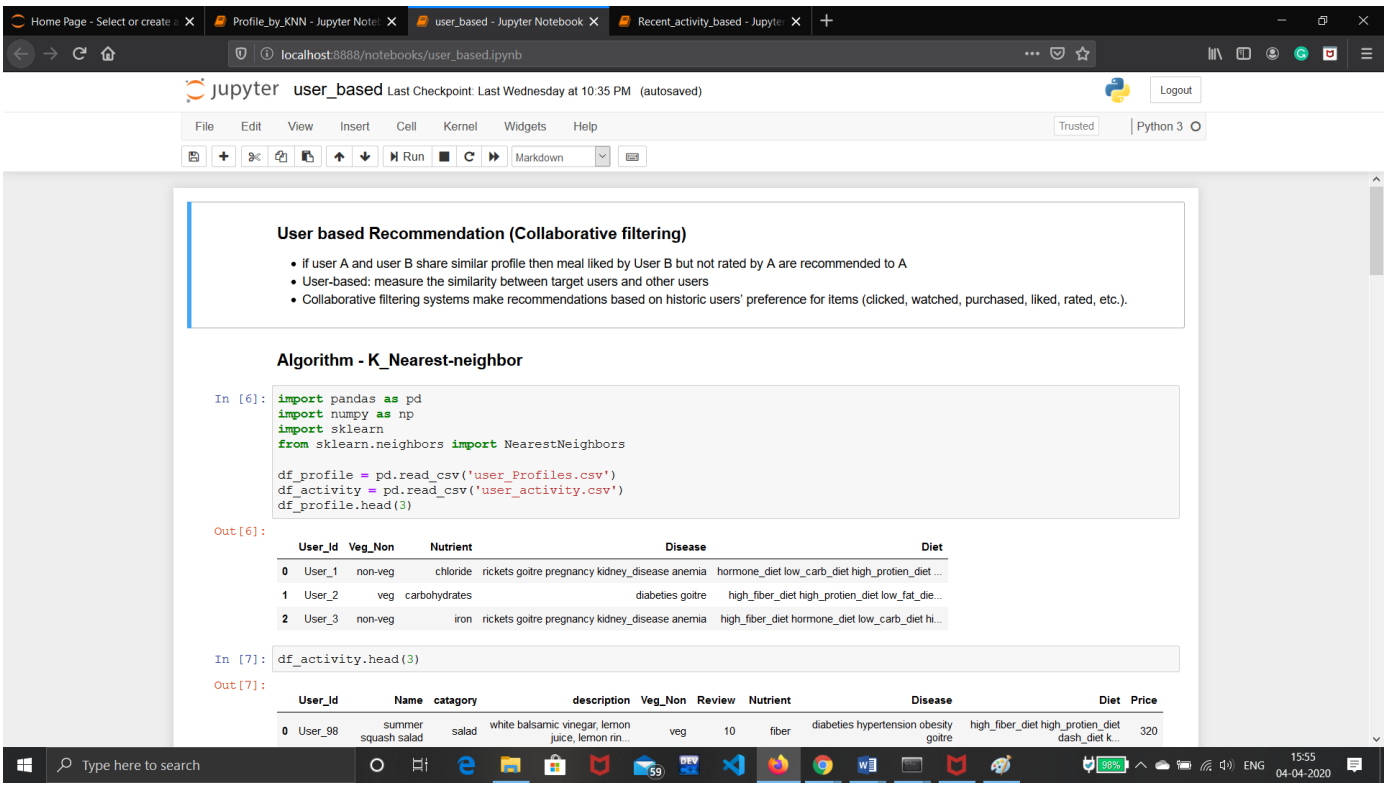


Fig: Recommendation based on user past orders

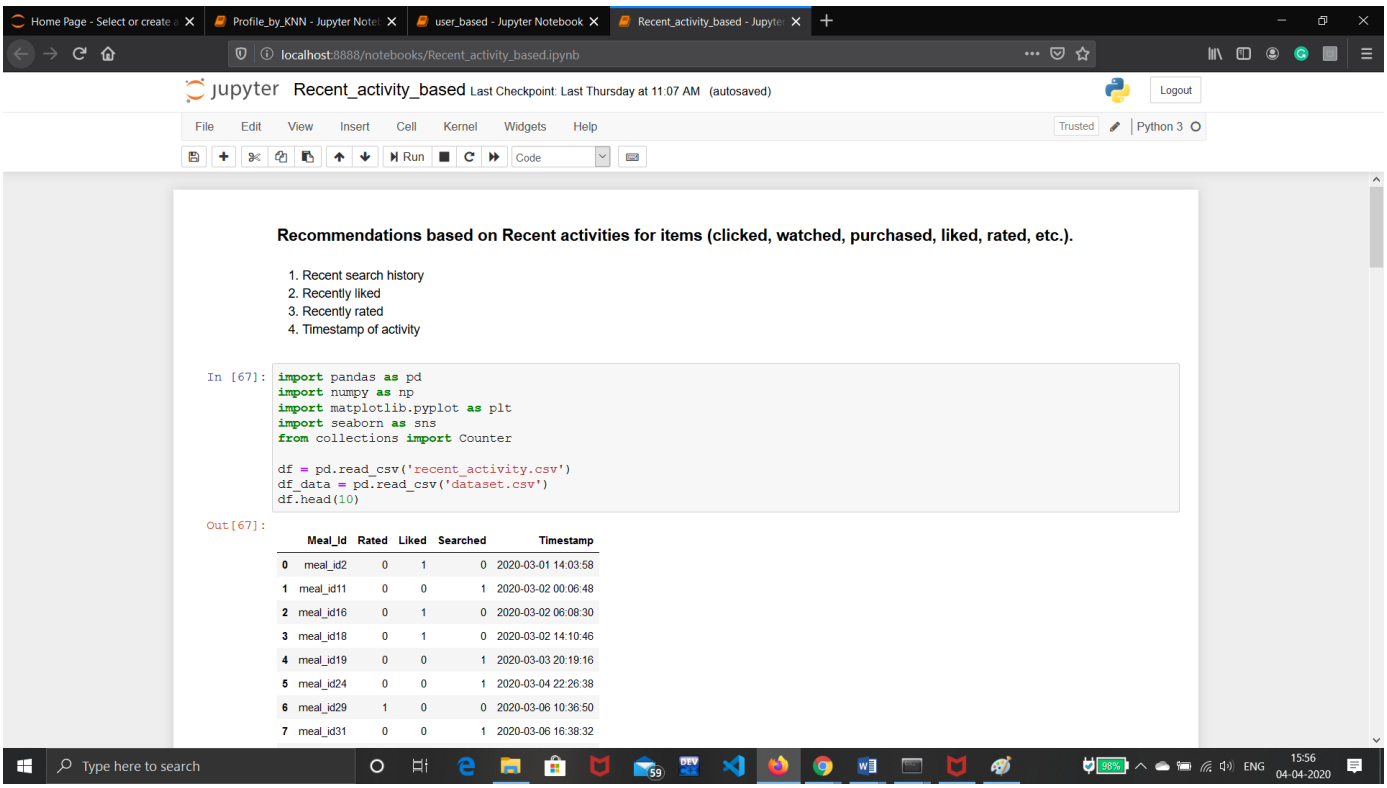


Fig: Recommendation based on User's recent activity

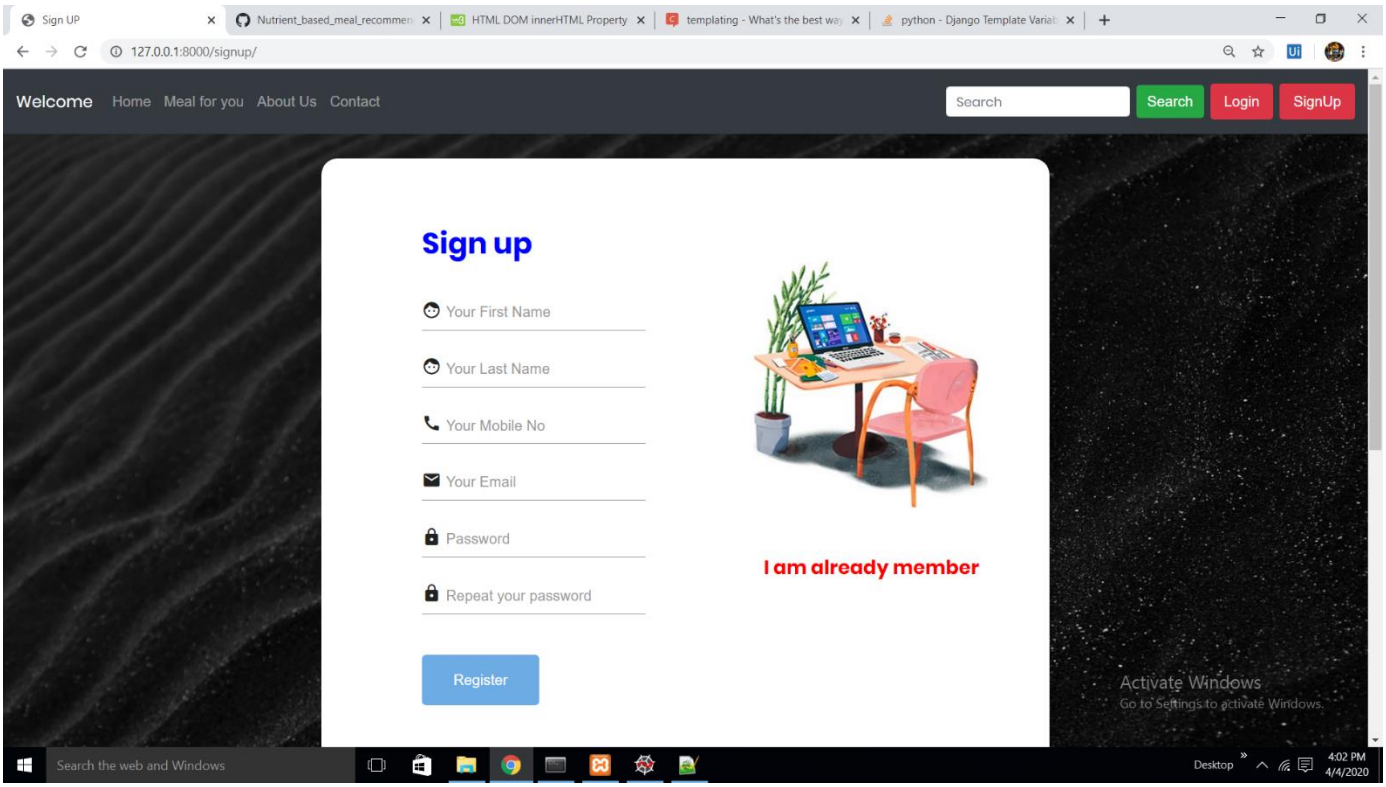


Fig: Signup/login interface

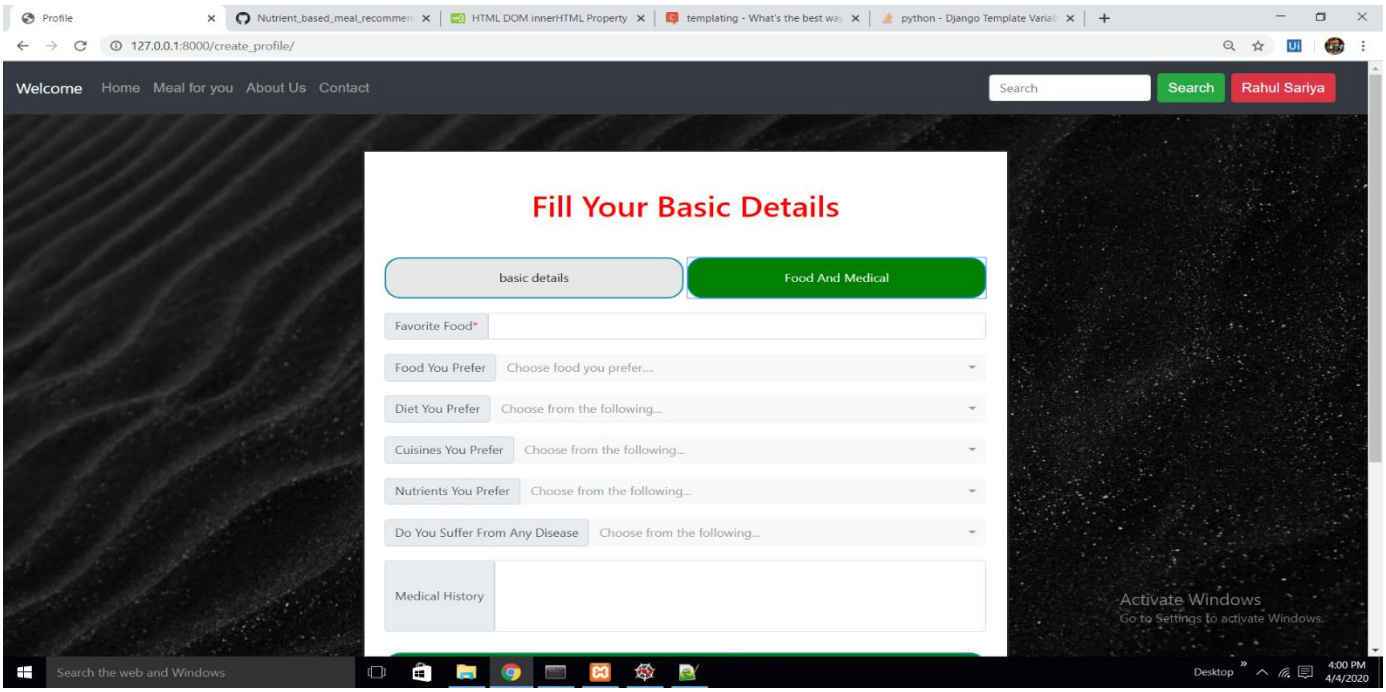


Fig: UI for User preference

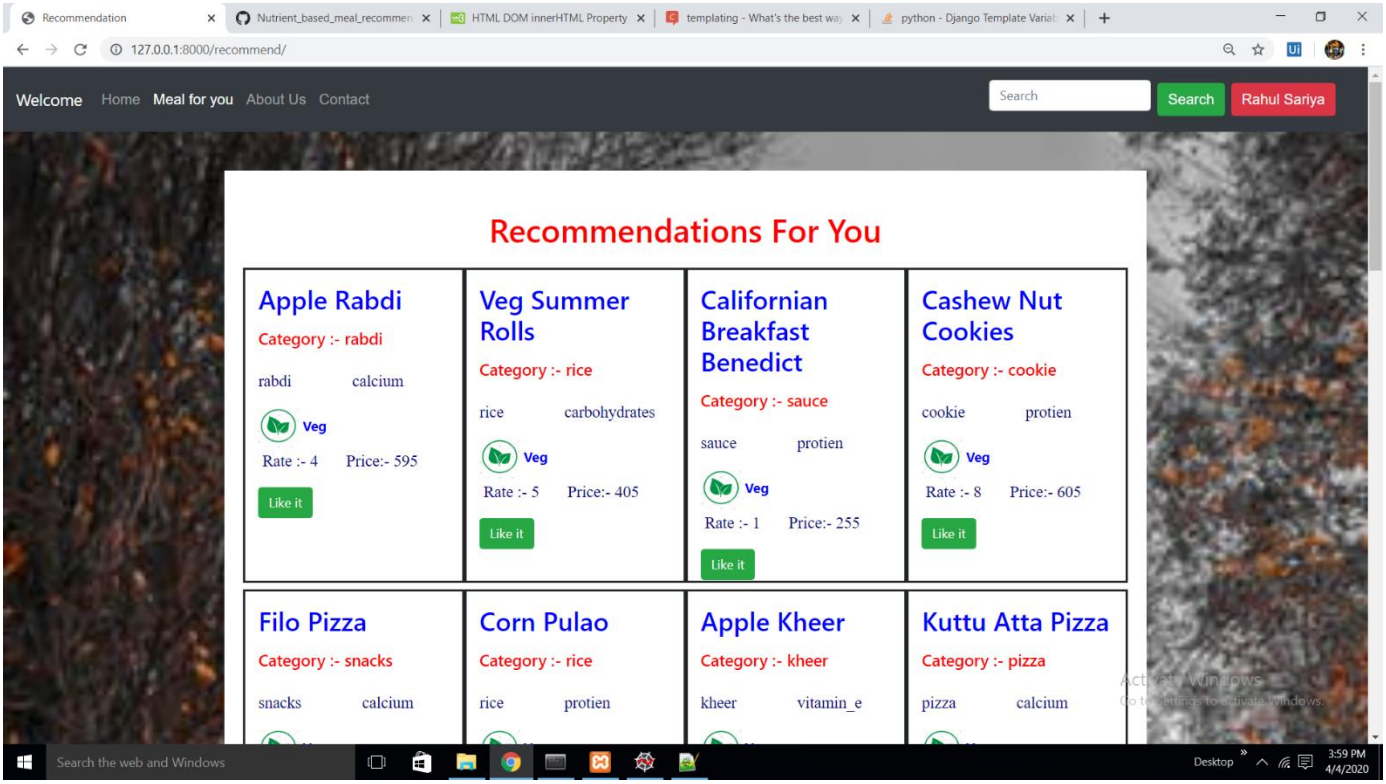


Fig: Final Recommendations for user

CHAPTER 5: MAINTENANCE

5.1Corrective Maintenance

As application could be sold or deployed for public use. There could be unresolved issues and if a user complains about it, the maintenance has to be done.

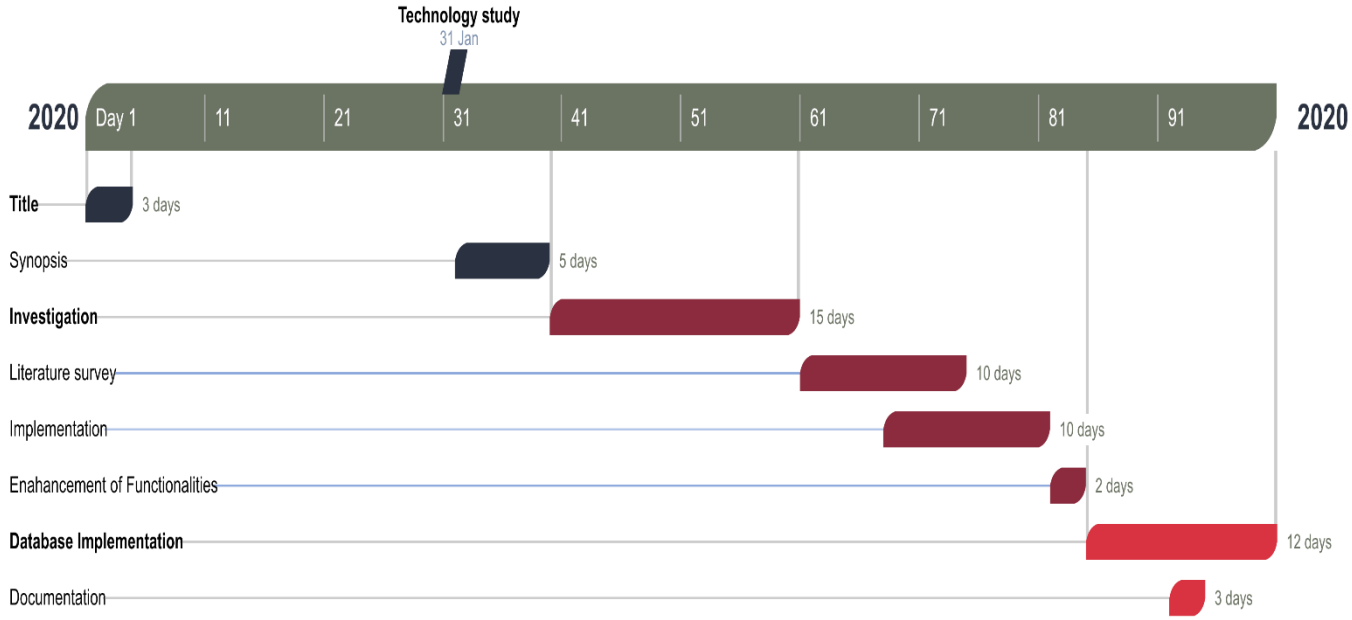
5.2 Adaptive Maintenance

The data in the application does not include all the ingredients and food items, thus the data needs to be updated in future.

Project Plan

Gantt Chart

A Personalized Meal Recommender System



CHAPTER 6: CONCLUSION

6.1Conclusion

The project Meal Recommendation System was successfully completed by using Content Based and collaborative Filtering by K nearest Neigbbor Algorithm. The data set were collected by web scraping which was preprocessed on the basis attributes. The data were then used to model the system.

6.2 Recommendation

The data in the application is based on the data received from web scraping. In order to further improve this product, it is important to collect data of all the ingredients and food items.

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