CHAPTER 1

INTRODUCTION

1.1. OVERVIEW OF THE PROJECT

An Online shop that has various products needed as per user's needs. The system is built to help users in shopping and shop based on their recommendation. The system takes users choice and shops on their behalf. In the System we are going to develop app which could get the amount into Wallet from the user and this amount will be used to calculate how many ingredients can be bought using this amount and what are the food dishes can be made are recommend to the user based on the ingredients. fetches the best deal for the user within no time. This system will be user friendly for users to know the food recommendation and item list based on the wallet system. The system is proposed to be built on artificial intelligence techniques that ensure hassle free shopping experience for users. The system also includes wallet integration. Wallet integration ensures a good mobile shopping experience. The integration of both these system allows users to just enter his choices and the system fetches the best deal for the user within no time. We execute this idea using algorithms like Inverse cooking algorithm, cluster filtering and Collaborative filtering, which is mainly used for food recommendation for users. This could help users for better experience to lead their daily life.

1.2 SCOPE OF THE PROJECT

Firstly, the recipe recommendation system is shown to the user is done based on the mapping between the ingredients selected . Initially the ingredients and price of ingredients are shown in a form of list which is given in the database. These lists are shown to the user suggestions to make it easier for user to select their needs from the list based on their requirements. These needs are then considered and processed using the algorithm and based on the suggestions by the algorithm the recipe is recommended to the user from the option they selected. This makes the process more easier and comfortable for users to get recipes for them based on their needs. This can also be measured based on the budget of users by comparing the prices of the vegetables given in the list of database.

1.3 NEED OF THE PROJECT

The need of project is based on the user necessities , preference and user friendly options to make it easier. This system of recipe recommendation tries to achieve all these possibilities by making it easier for user interaction and increases the modules and requirements to satisfy the requirements of the user to feel at ease to use the system . This system is make the communication better and easier for deaf and dum impaired people to communicate with other normal peoples who can understand there communication easily. This will make the life of people easier ,which enhances communication with there territory but also enhances with different languages to make the communication easier even at other states or countries.

CHAPTER 2

REVIEW OF LITERATURE

2.1 INTRODUCTION

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites. Before building the system, the above considerations are taken into account for developing the proposed system.

A major part of the project development sector considers and fully survey all the required needs for developing the project. For every project Literature survey is the most important sector in software development process. Before developing the tools and the associated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength. Once these things are satisfied and fully surveyed, then the next step is to determine about the software specifications in the respective system such as what type of operating system the project would require, and what are all the necessary software are needed to proceed with the next step such as developing the tools, and the associated operations.

2.2 LITERATURE SURVEY

1. M Wallet Technology Acceptance by Street Vendors in India, Komal Chopra ,Computer Engineering Department, Cummins College of Engineering for Women, Pune.

In this paper it is based on the wallet system used by the vendors .In this system the data is listed to the vendors based on the details in the dataset. Based on the dataset with vendor needs like ingredients or vegetables name along with price is listed which is given from the database. Based on these details the user can get the data which can be based on their preferences . This process is simple and efficient method of displaying the details in the form of table for the needs of user.

2. Recipe Recommendation Based on Ingredients using Machine Learning., Ms. Soundarya Desai, Ms. Pooja Patil, Mr. Pratik Shinde, Mr. Azhar Sayyed, Prof. Rohini Bhosale., Computer Science & Engineering , Paavai Engineering College, Namakkal.

In this paper it is mainly based on the recipe recommendation system for the children. To meet the day to day needs and preferences of the teachers. To attract children liking, parent need to exchange the menu every day. Parents not only think to what recipe to changes, they also need to consider the nutrition that their children taken. Besides that, some people will forget buy ingredients to stock in their kitchen. This will become a problem when they want to prepare meal within short time. It is difficult to think what to cook with limited ingredient that in the kitchen Many people often cook a dish with a cooking recipe on Websites and magazines. The listed ingredients in the recipe sometimes cannot be prepared. This paper propose a recommendation system for different ingredients. The recommendation ingredients based on co-occurrence frequency of ingredients on recipe database and ingredient

category stored in a cooking ontology. For object detection open CV is used which is java based. Basically we are using this platform for feature extraction of ingredients. Grey scale of the image is calculated, further histogram is generated which helps in identification of the food items.

3. Personalized Recipe Recommendation System using Hybrid Approach, Lipi Shah, Hetal Gaudani, Prem Balani, University of Ibadan, Nigeria.

This paper describes the recommendation system in culinary domain. With the prevalence of internet, whole world is connected and different users of different countries are sharing millions of new recipes on the internet, world widely. So, as a result users are not aware of the all the recipes on the web. Recipe contains different heterogeneous information's like ingredients, cooking procedure, categories etc. So, we think the recipe is aggregation of the different heterogeneous features. Most of the recommendation system is based on the content or collaborative filtering to predict the new recipe of interest for a user. Incorporating with the both the filtering techniques, we present an effective and elegant framework for combining both techniques in recipe recommendation system. Most of the recipe recommendation system uses content information as ingredients or cooking procedures of recipes. We proposed the hybrid approaches by incorporating conventional techniques, content as well as collaborative filtering, by adding more heterogeneous information of recipes like cuisines, preparation direction, dietary etc. and try to reduce RMSE than the conventional recommendation system

4. Food Recommender Systems Important Contributions, Challenges and Future Research Directions, Christoph Trattner, David Elsweiler ,R. H. Sapat College of Engineering, Department of Computer Engineering Management Studies and Research, Nashik .

This paper presents a general framework for daily meal plan recommendations, incorporating as main feature the simultaneous management of nutritional-aware and preference-aware information, in contrast to previous works which lack of this global viewpoint. The proposal incorporates a pre-filtering stage that uses AHPSort as multi-criteria decision analysis tool for filtering out foods which are not appropriate to the current user characteristics. Furthermore, it incorporates an optimization-based stage for generating a daily meal plan whose goal is the recommendation of food highly preferred by the user, not consumed recently, and satisfying his/her daily nutritional requirements. A case study is developed for testing the performance of the recommender system.

5. A food recommender system considering nutritional information and user preferences , Raciel Yera, Ahmad A. Alzahrani, Luis Martínez., Department of Information and Technology, G H Raisoni College of Engineering, Nagpur, India.

In this paper it mainly focuses on the lanaguge translation . This paper is about recognition and language translation. This recognises the hand written texts from the books and these hand written texts are recognised based on image processing techniques by comparing the images with the given alphabets of datasets. The recognised output is converted initially into regional languages and these are undergone with language translation to translate from regional language to other desired language based on user needs. Here they completed

implementation by converting the recognised pattern into three different lanagues like Marathi, English and Gujarathi. These hand written texts are recognised using the OCR (Optical Character Recognition Technique) and for lanague translation , a translator using MATLAB has been used for to achieve the desired output based on user needs.

2.3 EXISTING SYSTEM

Everything which is found is not so new, everything is existing here.Our ideas and implementation and growth of our ideas are just an update to the existing system.It just enhances and increases the efficiency of the system based on the time and need of the people.Likewise this has also some existing system. In the existing of food recommendation system the food and reciepies are recommended based on the images or the food is recommended to users in a random manner. These will not consider the budget amount of users or the ingredients present with the users to suggest the foods .This will not be mostly based on the habitual foods of users and it will be a random and common recommendation based on the name or the image . So to overcome the deficiency of the old system and to improve the system with more important features the food recommendation system using Wallet system is being claimed.This will make the life of users at ease and comfortable .This will help users to get the food recommendation based on the budget of users and items list to make it more efficient using the necessary algorithms like clustering and Inverse cooking algorithm.

CHAPTER 3

SOFTWARE REQUIREMENT SPECIFICATION

3.1 SYSTEM ANALYSIS

The detection of recommendation system by the computer makes an human computer interaction. This human computer interaction is now lately increased in many ways. The recommendation system is also included in this interaction. This makes the computer to collaborate with the life of humans. In this recipe recommendation system, the recommendation for recipes based on ingredients are analysed based on the features of the input image. This system analysis the type of input image which is efficient to get processed and analyse the feature of the ingredients based on amount to predict recipes. In previous this system was done using a recommendation system which is so simple and it does not based on the budget. Initially it was less efficient process and later many algorithms are used but it takes more time and space to complete the process .So to overcome this issue in our system we have used a latest algorithm of Inverse cooking Algorithm which makes the system more efficient with less time for training and with minimum number of lines of code and the accuracy rate of the output is high in this algorithm which makes the system complete.

3.2 FEASIBILITY STUDY

The feasibility of the project is analysed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. This system is very easy to implement that it requires only small lines

of code which is time and space complexity to produce a efficient result of the desired output as expected by the user.

The feasibility study investigates the problem and the information needs of the stakeholders. It seeks to determine the resources required to provide an information systems solution, the cost and benefits of such a solution, and the feasibility of such a solution.

The goal of the feasibility study is to consider alternative information systems solutions, evaluate their feasibility, and propose the alternative most suitable to the organization. The feasibility of a proposed solution is evaluated in terms of its components.

3.2.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available as it only requires the basic system requirement with web cam and graphic card.

3.2.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only

minimal or null changes are required for implementing this system. This system uses latest Inverse Cooking algorithm which decreases the time for training and space for storing code which makes it more efficient that others.

3.2.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. This is more user friendly to used by people, which can be easily implemented.

3.3 SYSTEM REQUIREMENTS

3.3.1 HARDWARE REQUIREMENTS:

- POWER SUPPLY-Transformer
- RASPBERRY PI

1. Power Supply

Transformer - The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.
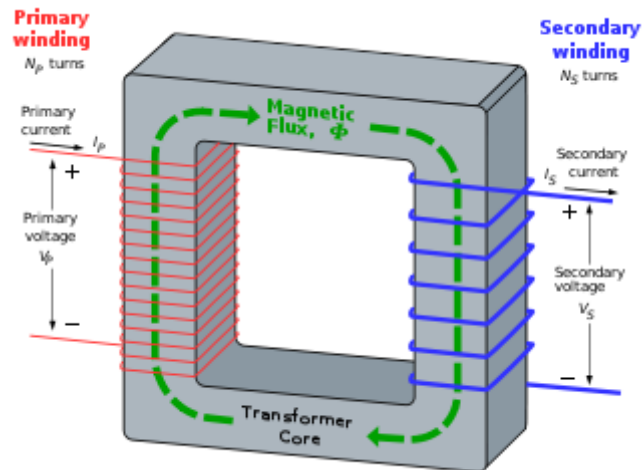
FIG 3.3.1:POWER SUPPLY

3.Raspberry Pi - The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B.

3.3.2 SOFTWARE REQUIREMENTS:

- Operating System   -   Windows 10
- Coding Language   -   Python
- IDE   -   Pycharm
- Database   -   Own dataset created.

CHAPTER 4

SYSTEM DESIGN

4.1 INTRODUCTION

Design is a multi- step that focuses on data structure software architecture, procedural details, algorithm and interface between modules. The design process also translates the requirements into presentation of software that can be accessed for quality before coding begins. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. Until the 1990s, systems design had a crucial and respected role in the data processing industry. In the 1990s, standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering. The architectural design of a system emphasizes the design of the system architecture that describes the structure, behaviour and more views of that system and analysis. It is meant to satisfy specific needs and requirements of a business or organization through the engineering of a coherent and well-running system. They needed to be able to standardize their work into a formal discipline with proper methods, especially for new fields like information theory, operations research and computer science in general. Computer software design change continuously as new methods; better analysis and border understanding evolved. Software design is at relatively early stage in its revolution. Therefore, software design methodology lacks the depth, flexibility and quantitative nature that are normally associated with more classical

engineering disciplines. However techniques for software designs do exit, criteria for design qualities are available and design notation can be applied.

4.2 PROPOSED SYSTEM

Our proposed methododlogy is based on the Machine learning technique which is used to ease the shopping experience of people. This methos is used for people to know what are the ingredients can be bought based on their budget set amount. Nowadays many people don't know the amount of items needed for day to day lives and amount of ingredients to be used for day to day food which we make .They just buy everything with the money they have and still most of the food becomes stored and it becomes unhealthy for people to consume. So to make people understand their needs a app can be made for user which records the amount in Wallet attached in the app and based on the amount in the Wallet a items list are recommended to users to buy for their food for that day and if those items are accepted by user it means user has these items then the user is given with necessary food recipie based on the ingredients selected .so it makes it user for calculate the amount to be bought for per day food which reduces food storage and wastage and it also gives ease of experience in food making easily for their day to day life.
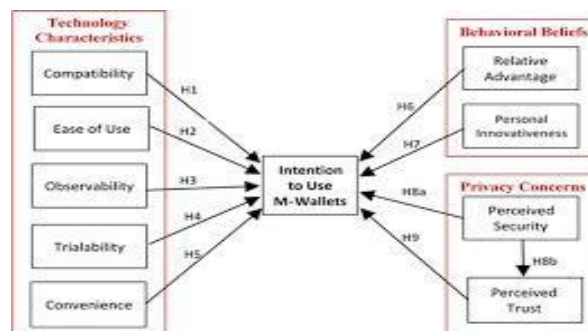
FIG.4.2.1 BENEFITS

4.3 METHODOLOGY

1. Data Collection
2. Filtering
3. Recipe recommendation

4.3.1 DATA COLLECTION

- Data collection is the process of collecting and gathering information related to the topic. It majorly collects the requirements and datasets needed for the project. It is the process of gathering quantitative and qualitative information about the requirements of project with the aim of evaluating outcomes . Good data collection requires a clear process to ensure the data collected is clean ,consistent and reliable.

- The original MNIST image dataset of handwritten digits is a popular benchmark for image-based machine learning methods.

- The CSV data file was collected from the Kaggle website. This dataset contains reviews of fine foods from amazon. The data spans over a period of more than 10 years, including all ~500,000 reviews up to October 2012. Reviews include product and user information, ratings, and a plain text review. It also includes reviews from all other Amazon categories.

- Dataset has over 500,000 rows and 10 columns dating from 1999 to 2012. It contains information regarding User Id, Product Id, helpfulness of review, review score (1–5 starts), time in Unix format, and review text.

4.3.2 FILTERING

Cluster analysis, or clustering, is an unsupervised machine learning task. It involves automatically discovering natural grouping in data. Unlike supervised learning (like predictive modeling), clustering algorithms only interpret the input data and find natural groups or clusters in feature space Using clustering can address several known issues in recommendation systems, including increasing the diversity, consistency, and reliability of recommendations; the data sparsity of user-preference matrices; and changes in user preferences over time. Collaborative filtering is a family of algorithms where there are multiple ways to find similar users or items and multiple ways to calculate details based on datasets matching. Depending on the choices you make, you end up with a type of collaborative filtering approach. User-based collaborative filtering, calculates the similarity between users through analyzing the user's diet-frequency matrix. Then it finds a collection of users with similar dietary records and recommends foods that the target users have not eaten but may like to eat. K-means algorithm is an iterative algorithm that tries to partition the dataset into Kpre-defined distinct non-overlapping subgroups (clusters) where each data point belongs to only one group.

4.3.3 RECIPIE RECOMMENDATION
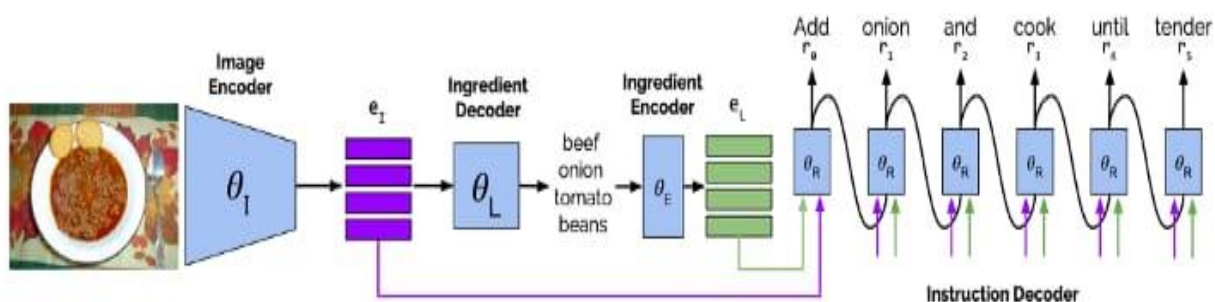
FIG4.3.3.1 INVERSE COOKING ALGORITHM

This recipe retrieval algorithm was developed by Facebook AI Research and it is able to predict ingredients, cooking instructions and a title for a recipe, directly from an imageIn the past, algorithms have been using simple systems of recipe retrieval based on image similarities in an embedding space. This approach is highly dependent on the quality of the learned embedding, dataset size and variability. Therefore, these approaches fail when there is no match between the input image and the static dataset.Inverse cooking algorithm instead of retrieving a recipe directly from an image, proposes a pipeline with an intermediate step where the set of ingredients is first obtained. This allows the generation of the instructions not only taking into account the image, but also the ingredients

4.4 ALGORITHM

An algorithm is a step-by-step procedure that defines a set of instructions that must be carried out in a specific order to produce the desired result. Algorithms are generally developed independently of underlying languages, which means that an algorithm can be implemented in more than one programming language. An algorithm is a set of instructions for solving a problem or accomplishing a task. One common example of an algorithm is a recipe, which consists of specific instructions for preparing a dish or meal. Algorithms are in everything we do. They're a crucial part of computational thinking and problem-solving in many areas of life, as we use algorithms to accurately and efficiently execute tasks.
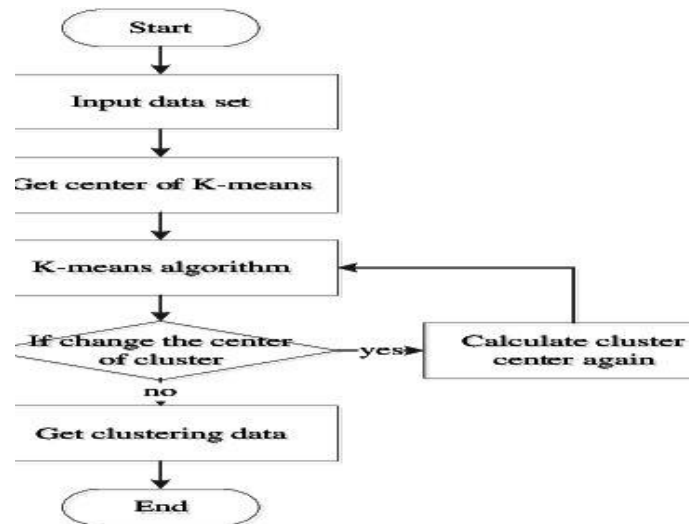
Algorithm are :

- K-means
- Clustering
- Collaborative filtering
- Inverse cooking

4.4.1 K-means

K-means clustering algorithm computes the centroids and iterates until we it finds optimal centroid. It assumes that the number of clusters are already known. It is also called flat clustering algorithm. The number of clusters identified from data by algorithm is represented by 'K' in K-means. In this algorithm, the data points are assigned to a cluster in such a manner that the sum of the squared distance between the data points and centroid would be minimum. It is to be understood that less variation within the clusters will lead to more similar data points within same cluster. K-means follows Expectation-Maximization approach to solve the problem. The Expectation-step is used for assigning the data points to the closest cluster and the Maximization-step is used for computing the centroid of each cluster. While working with K-means algorithm we need to take care of the following things –

• While working with clustering algorithms including K-Means, it is recommended to standardize the data because such algorithms use distance-based measurement to determine the similarity between data points.

• Due to the iterative nature of K-Means and random initialization of centroids, K-Means may stick in a local optimum and may not converge to global optimum. That is why it is recommended to use different initializations of centroids.

FIG 4.4.1 K Means algorithm

4.4.2 CLUSTERING ALGORITHM

This stage consists of two steps. The first step is to determine the number of clusters to get the optimal number of clusters using the Silhouette Coefficient. The second step is to group the user data using the k-means algorithm, where k is the number of clusters with the maximum Silhouette Coefficient value.

4.4.3 COLLABORATIVE FILTERING

Collaborative filtering uses algorithms to filter data from user reviews to make personalized recommendations for users with similar preferences. To address some of the limitations of content-based filtering, collaborative filtering uses similarities between users and items simultaneously to provide recommendations. Collaborative filtering is a technique used by recommender systems. Collaborative filtering has two senses, a narrow one and a more general one.

4.4.4 INVERSE COOKING ALGORITHM

Inverse cooking algorithm instead of retrieving a recipe directly from an image, proposes a pipeline with an intermediate step where the set of ingredients is first obtained. This allows the generation of the instructions not only taking into account the image, but also the ingredients One of the major achievements of this method was to present higher accuracy than a baseline recipe retrieval system [2] and average human [1], while trying to predict the ingredients from an image.
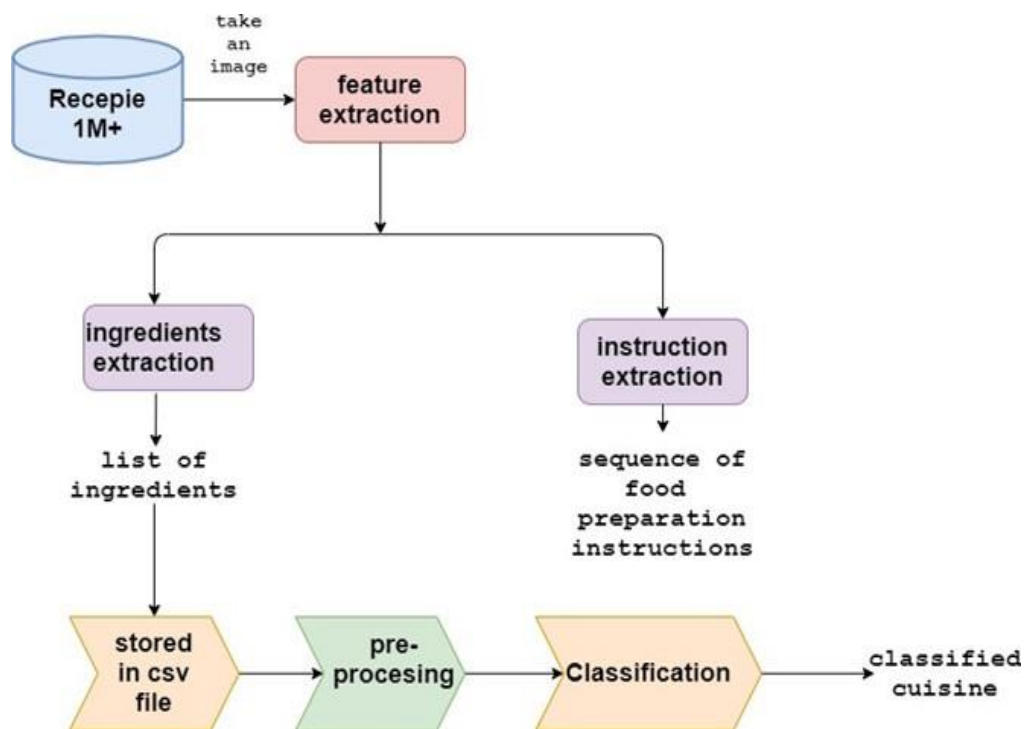

FIG 4.4.4.1 WORK FLOW OF ICA

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 PYTHON

5.1.1 PYTHON TECHNOLOGY

Python is an interpreted, object-oriented programming language similar to PERL that has gained popularity because of its clear syntax and readability. Python is said to be relatively easy to learn and portable, meaning its statements can be interpreted in a number of operating systems including UNIX based systems, Mac-OS, MS-DOS, OS/2, and various versions of Microsoft windows 98. Python was created by Guido Van Rossum, a former resident of Netherlands, whose favourite comedy group at the time was Monty Python's flying circus. The source code is freely available and open for modification reuse. Python has a significant number of users.

A notable feature of python is it's intending of source statements to make the code easier to read. Python offers Dynamic datatype, ready-made class and interfaces to many system calls and libraries. It can be extended using the C or C++ language.

Python can be used as the script in Microsoft's Active Server page (ASP) technology. The scoreboard system for the Melbourne (Australia) cricket ground is written in python. Z object publishing environment, a popular web application server is also written in python language.

5.1.2 PYTHON PLATFORM

A part from Windows, Linux and MacOS , CPython implementation runs on 21 different platforms. In our project, The python code is run in pycharm platform because it is user friendly to handled by the beginners. The python is used by us in our project because it can produce a project in minimum number of lines of code.

5.1.3 PYTHON LIBRARY

Python's large standard library, commonly cited as one of its greatest strengths, provides tools suited to many tasks.
As of November 2019, the Python Package Index (PyPI), the official repository for third-party Python software, contains over 200,000 packages with a wide range of functionality, including:

- Automation
- Data analytics
- Databases

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- Graphical user interfaces

- Image processing

- Machine learning

- Multimedia

- Networking

- Scientific computing

- System administration

- Test frameworks

- Text processing

Machine Learning, as the name suggests, is the science of programming a computer by which they are able to learn from different kinds of data. A more general definition given by Arthur Samuel is – "Machine Learning is the field of study that gives computers the ability to learn without being explicitly programmed." They are typically used to solve various types of life problems.

In the older days, people used to perform Machine Learning tasks by manually coding all the algorithms and mathematical and statistical formula. This made the process time consuming, tedious and inefficient. But in the modern days, it is become very much easy and efficient compared to the olden days by various python libraries, frameworks, and modules. Today, Python is one of the most popular programming languages for this task and it has replaced many languages in the industry, one of the reason is its vast collection of libraries. Python libraries that used are:

- Numpy

- K-means

- Tensor Flow

- Keras

- PyTorch

- Pillow

- Matplotlib

1.Numpy - Numpy is a python library used for working with arrays. It is a library consisting of multidimensional array objects and a collection of routines for processing of array. It also has functions for working in domain of mathematical and logical operations on arrays, linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely. NumPy stands for Numerical Python.

NumPy is a Python library that provides a simple yet powerful data structure: the **n-dimensional array**. This is the foundation on which almost all the power of Python's data science toolkit is built, and learning NumPy is the first step on any Python data scientist's journey. This tutorial will provide you with the knowledge you need to use NumPy and the higher-level libraries that rely on it.

Here are the top four benefits that NumPy can bring to your code:

1. **More speed:** NumPy uses algorithms written in C that complete in nanoseconds rather than seconds.

2. **Fewer loops:** NumPy helps you to reduce loops and keep from getting tangled up in iteration indices.

3. **Clearer code:** Without loops, your code will look more like the equations you're trying to calculate.

4. **Better quality:** There are thousands of contributors working to keep NumPy fast, friendly, and bug free.

Because of these benefits, NumPy is the de facto standard for multidimensional arrays in Python data science, and many of the most popular libraries are built on top of it. Learning NumPy is a great way to set down a

solid foundation as you expand your knowledge into more specific areas of data science.

1.1:Installing Numpy - It's time to get everything set up so you can start learning how to work with NumPy. There are a few different ways to do this, and you can't go wrong by following the instructions on the NumPy website. But there are some extra details to be aware of that are outlined below.

1.2: Using Repl. it as an Online Editor - If you just want to get started with some examples, follow along with this tutorial, and start building some muscle memory with NumPy, then Repl.it is a great option for in-browser editing. You can sign up and fire up a Python environment in minutes. Along the left side, there's a tab for packages.

1.3:Installing Numpy With Anaconda:

The Anaconda distribution is a suite of common Python data science tools bundled around a **package manager** that helps manage your virtual environments and project dependencies. It's built around conda, which is the actual package manager.

2.Pillow - The Python Imaging Library adds image processing capabilities to your Python interpreter. This library provides extensive file format support, an efficient internal representation, and fairly powerful image processing systems. The core image library is designed for fast access to store data stored in few basic pixel formats .

3.Compared Methods - To evaluate the effectiveness of our method we compared our method with the other methods. By comparing with this method, to demonstrate the effectiveness of our method. Moreover, compare the methods without some part of our method. By comparing them, to evaluate the necessity of each part of our method.

1.HMM Method: This method learns the users behaviour by HMM. This method uses the observations obtained by the sensors and/or statuses of devices. This

method learns the parameters of the HMM so as to suit the sequences of the observations. Then, by using the learned model, this method detects anomalous operations if an operation whose estimated probability is less than a threshold occurs.

2.Variant of our methods: It shows the variants of our method used in this section. The details of the variants are as follows.

- **1.Only condition:** One important aspect of the proposed detection method is the use of event sequences and operation conditions. To investigate the effectiveness of using event sequences, we compared the proposed method with a variant using only condition information. For this evaluation, it used only the time of day as a condition, which was stored as part of the training data. Then, it is defined as an anomaly when the number of operations that occur in the timeframe from Time α_1 to Time $+ \alpha_1$ is below n_1 L_{num}, is the time of day of the tested operation.

2.Without condition: In a smart home, user behavior depends on the conditions. To investigate the effectiveness of condition information, we compared the proposed method with ,a variant using only sequence information with noise removal. This method learns all event sequences in the same way as our method except that it does not use the condition information.

3.No noise removal: A smart home may have multiple users and monitored event sequences may include the oper- ation of multiple users. Thus, noise removal when learning the event sequences is also one of important aspects of our method. By removing noise (i.e., spurious events), the method learns essential event sequences. To investigate the effectiveness of noise removal, we also compared the proposed method with its variant without removing noise. Anomaly detection proceeded in the same manner for both compared methods. Specifically, when events A, B, and C are monitored, the comparison variant only learns the sequence A, B, C, whereas the proposed method learns the sequences generated by removing

noise .

4.Only sequence: This method simply learns user behaviors based on only sequences of events without noise removal method similar to the existing methods that learn user behaviors. By comparing our method with this method, it demonstrate the advantages of our method over the existing methods.

5.1.4 FEATURES OF PYTHON

Python provides many useful features which make it popular and valuable from the other programming languages. It supports object-oriented programming, procedural programming approaches and provides dynamic memory allocation. We have listed below a few essential features.

1.Easy to Learn and Use - Python is easy to learn as compared to other programming languages. Its syntax is straightforward and much the same as the English language. There is no use of the semicolon or curly-bracket, the indentation defines the code block. It is the recommended programming language for beginners.

2.Expressive Language - Python can perform complex tasks using a few lines of code. A simple example, the hello world program you simply type print ("Hello World"). It will take only one line to execute, while Java or C takes multiple lines.

3.Interpreted Language - Python is an interpreted language; it means the Python program is executed one line at a time. The advantage of being interpreted language, it makes debugging easy and portable.

4.Cross-platform Language - Python can run equally on different platforms such as Windows, Linux, UNIX, and Macintosh, etc. So, we can say that Python is a portable

language. It enables programmers to develop the software for several competing platforms by writing a program only once.

5.Free and Open Source - Python is freely available for everyone. It has a large community across the world that is dedicatedly working towards make new python modules and functions. Anyone can contribute to the Python community. The open-source means, "Anyone can download its source code without paying any penny."

6.Object-Oriented Language - Python supports object-oriented language and concepts of classes and objects come into existence. It supports inheritance, polymorphism, and encapsulation, etc. The object-oriented procedure helps to programmer to write reusable code and develop applications in less code.

7.Extensible - It implies that other languages such as C/C++ can be used to compile the code and thus it can be used further in our Python code. It converts the program into byte code, and any platform can use that byte code.

8.Large Standard Library - It provides a vast range of libraries for the various fields such as machine learning, web developer, and also for the scripting. There are various machine learning libraries, such as Tensor flow, Pandas, Numpy, Keras, and Pytorch, etc. Django, flask, pyramids are the popular framework for Python web development.

9.GUI Programming Support - Graphical User Interface is used for the developing Desktop application. PyQT5, Tkinter, Kivy are the libraries which are used for developing the web application.

10.Integrated - It can be easily integrated with languages like C, C++, and JAVA, etc. Python runs code line by line like C, C++ Java. It makes easy to debug the code.

11.Embeddable - The code of the other programming language can use in the Python source code. We can use Python source code in another programming language as well. It can embed other language into our code.

12.Dynamic Memory Allocation - In Python, we don't need to specify the data-type of the variable. When we assign some value to the variable, it automatically allocates the memory to the variable at run time.

5.2 THE PYTHON FRAMEWORK

Python is the go-to programming language for Data Science. Besides its inherent simplicity, what makes Python most appealing is that it is backed by a wide range of Python frameworks.

Python frameworks offer a well-defined structure for app development. Since they can automate the implementation of some standard solutions, they not only reduce the development time significantly but also allow Developers to focus on the core application logic instead of routine elements. Long story short – they make the job of Developers much easier and make Python one of the best programming language.

5.3 MODULES FOR IMPLEMENTATION:

- Data gathering
- Train the Dataset
- Filtering Data
- Recommendation system

5.4 SYSTEM DESIGN AND TESTING PLAN

1.Input Design - The input design of our system is that the imput images which we give to our system.These input images we give to the dataset is processed to produce the output of the system .The input images which we give are resized automatically and taken in a particular size and these images are stored in the respective folders of the dataset.This has been undergone a data pre-processing.

2.Output Design - A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. The output of our system is the face recognise and emotions of the user whichare predicted and shown through the webcam .

3.**Test Plan** - Software testing is the process of evaluation a software item to detect differences between given input and expected output and also to assess the feature of a software item. Testing assesses the quality of the product. Software testing is a process that should be done during the development process. In other words software testing is a verification and validation process.

4.Verification - Verification is the process to make sure the product satisfies the conditions imposed at the start of the development phase. In other words, to make sure the product behaves the way we want it to.

5.Validation - Validation is the process to make sure the product satisfies the specified requirements at the end of the development phase. In other words, to make sure the product is built as per customer requirements.

6.Basics of software testing - There are two basics of software testing: black box testing and white box testing.

1. Black Box Testing
2. White Box Testing

1.Black box Testing - Black box testing is a testing technique that ignores the internal mechanism of the system and focuses on the output generated against any input and execution of the system. It is also called functional testing.

2.White box Testing - White box testing is a testing technique that takes into account the internal mechanism of a system. It is also called structural testing and glass box testing. Black box testing is often used for validation and white box testing is often used for verification.

7.Types of testing

There are many types of testing like

- Unit Testing
- Integration Testing
- Functional Testing
- System Testing
- Stress Testing
- Performance Testing
- Usability Testing
- Acceptance Testing
- Regression Testing
- Beta Testing

1.Unit Testing - Unit testing is the testing of an individual unit or group of related units. It falls under the class of white box testing. It is often done by the programmer to test that the unit he/she has implemented is producing expected output against given input.

2.Integration Testing - Integration testing is testing in which a group of components are combined to produce output. Also, the interaction between software and hardware is tested in integration testing if software and hardware components have any relation. It may fall under both white box testing and black box testing.

3.Functional Testing - Functional testing is the testing to ensure that the specified functionality required in the system requirements works. It falls under the class of black box testing.

4.System Testing - System testing is the testing to ensure that by putting the software in different environments (e.g., Operating Systems) it still works. System testing is done with full system implementation and environment. It falls under the class of black box testing.

5.Stress Testing - Stress testing is the testing to evaluate how system behaves under unfavourable conditions. Testing is conducted at beyond limits of the specifications. It falls under the class of black box testing.

6.Performance Testing - Performance testing is the testing to assess the speed and effectiveness of the system and to make sure it is generating results within a specified time as in performance requirements. It falls under the class of black box testing.

7.Usability Testing - Usability testing is performed to the perspective of the client, to evaluate how the GUI is user-friendly? How easily can the client learn? After learning how to use, how proficiently can the client perform? How pleasing is it to use its design? This falls under the class of black box testing.

8.Acceptance Testing - Acceptance testing is often done by the customer to ensure that the delivered product meets the requirements and works as the customer expected. It falls under the class of black box testing.

9.Regression Testing - Regression testing is the testing after modification of a system, component, or a group of related units to ensure that the modification is working correctly and is not damaging or imposing other modules to produce unexpected results. It falls under the class of black box testing.

```
import pandas as pd
import numpy as np
from scipy.sparse import csr_matrix
from sklearn.neighbors import NearestNeighbors
import matplotlib.pyplot as plt
import seaborn as sns
#reading of the files
food=pd.read_csv("food.csv")
ratings=pd.read_csv("ratings.csv")
#done pivot table
dataset=ratings.pivot_table(index'Food_ID',columns='User_ID',values='Rating')
dataset.fillna(0,inplace=True)
#main recommendation function
Def food_recommentation(Food_Name):
```

```
N=10
FoodList=food[food['Name'].str.contains(Food_Name)]
if len(FoodList):
Foodi=FoodList.iloc[0]['Food_Id']
Foodi=dataset[dataset['Food_Id] ==Foodi].index[0]
distance,indices=model.kneighbours(csr_dataset[Foodi],n_neighbors=n+1)
Food_indices=sorted(list(zip(indices.squeeze().tolist(),distance.squeeze().tolist())),
Recommentation=[]
for val in Food_indices:
Foodi=dataset.iloc[val[0]]['Food-ID']
i=food[food['Food_Id']==Foodi].index
Recommendations.append({'Name':food.iloc[i]['Name'].values[0],'Distance':val[1]}
)df=pd.DataFrame(Recommendations,index=range(1,n+1))
retrun df['Name']
else:
retrun "No Similar Foods:"
#remove sparsity
csr_dataset=csr_matrix(dataset.values)
dataset.reset_index(inplace=True)
dataset.reset_index(inplce=True)
#using algorithm
model=NearstNeighbors(metric='cosine',algorithm='brute',n_neighbors=20,
n_jobs=-1)
model.fit(csr_dataset)
food_recommendation
```

CHAPTER 6

CONCLUSION

This project is helpful for the users in their day to day life to chose food based on the daily budget of people. This can be mainly used to save money ,time .food wastage ,money wastage and be aware and get away from frozen foods. The home made foods are good for health .This will make the life of users to be in ease and comfortable. Food Recipe Recommendation System which helps us to search for cooking recipes once an ingredient list is entered or built-in camera is pointed to food ingredients and that too instantly. For now, the recipes are classified on the basis that the recipe involving recognized ingredient will be put on top and the ones including addition of ingredients at the bottom of the menu list. Moreover, user can search recipes by their states or by their meal i.e. Breakfast, lunch, dinner, etc.

FUTURE ENHANCEMENT

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Now this project is used for item and food recommendation based on the given amount .In future this project can be integrated with the diet of people and the users are also notified for the food based on their food style and diet chart and also can be recommended with different food based on breakfast ,lunch ,dinner based on the information given by the user. This will act as a form of food recommendation along with personal AI diet assistant which can be helpful for daily life of users.

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