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Food Classification using Raspberry PI

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Abstract: *The manually work is these people have to get knowledge or in- formation from different kind of sources like books, people, etc.. But these is exceptionally troublesome to discover out answers for inquiries of approximately their issues So from this food Recipe Management System project we are giving ultimate solution for all of them that is we are making application where each and every user can give input as image of food. And out system will show the recipe of the food. These applications have username and password. For security purpose. and our application is contain about all the food items with irrespect of the region or country. so, our application is open for any one with irrespect of country and region. To resolve the issues of the previous things we are not providing any restriction for the user to see application*

Keywords: CNN, Raspbery Pi, Segmentation, Feature Extraction, Deep Learning

I. INTRODUCTION

Cooking is the foremost skilled one where each one cannot do it. for a few of them cooking is pastimes and for a few of the it is time pass. Planning modern things are test one only few them exist within the past time. but presently each one was attempting in planning modern things independent of locale and nation. And for a few of the cooking is commerce where they can keep up inn or eatery. And for a few of them likes to tasting a diverse kind of nourishment items. And for all sorts of individuals over got to do physically work to know almost the arrangement of modern nourishment things and to individuals

II. LITREATURE REVIEW

Paper Name: Food Category Representatives: Extracting Categories from Meal Names in Food Recordings and Recipe Data
Author: Sosuke Amano, Kiyoharu Aizawa.
Abstract: Food Log is a multimedia recording tool for producing food records for many individuals. More than a million food records for user meals have been created by Food Log in its first year of operation. In these data, we located nearly 70,000 distinct food records. One of the difficulties in analyzing them is separating meal categories from so many records. We suggest a technique in this paper for condensing a meal name into a shorter representation. First, we use a k-nearest neighbor search to gather similar meal names. The relationship between the meal names and items in the database is then modelled using a word graph. We choose representative words by determining the bare minimum paths in the word graph. the word graph's paths. Finally, we get a handful of words that denote categorical data regarding the original meal name. We used the technique to analyze information from food records in the Food Log and Rakuten Recipe databases. Our findings demonstrate that the technique was successful for both datasets

Paper Name: Suggestion Analysis for Food Recipe Improvement
Author: Pakawan Pugsee, Monsinee Niyomvanich.
Abstract: Abstract: Idea investigation for food recipe improvement is to recognize accommodating ideas from client remarks to work on the recipes. Therefore, client com-ments about food recipes are characterized into two gatherings that are remarks with sug-gestions or without ideas. The rules for interpreting meaning and word information from altered lexicons are used to analyze those comments or opinions. The proposed analysis method includes text analysis and natural language processing. The mechanize remark investigation can assist the two clients with picking the favored food recipes and recipe creators to foster their own imaginative recipes. The user comments are collected and categorized into suggestion comments and other comments to provide a summary of the improvement of the food

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recipe. The assessment of favorable to presented idea investigation shows that the exactness and accuracy of remark classi-fication are more than 70

Paper Name: Food Image to Cooking Instructions Conversion Through 3.Compressed Embeddings Using Deep Learning
Author: Madhu Kumari, Tajinder Singh,
Description:— The image understanding in I lie era of deep learning is burgeoningnot only in terms of semantics but also in towards the generation of a meaningful descriptions of images, this requires specific cross model training of deep neural networks which must be complex enough to encode the fine contextual informationrelated to the image and simple enough enough to cover wide range of inputs. Con-version of food image to its cooking description/instructions is a suitable instance ofthe above mentioned image understanding challenge. Using cross model training of CNN, LSTM, and Bi-Directional LSTM, this paper proposes a novel approach to obtaining the compressed embeddings of cooking instructions on an image of a recipe. Variable instructions' length, the number of instructions per recipe, and the presence of multiple food items in a food image present the greatest obstacles. By achieving condensed embeddings of cooking instructions that are highly similar to the original instructions, our model successfully overcomes these obstacles through transfer learning and multi-level error propagation across various neural networks. We have specifically experimented with web-scraped Indian cuisine data (food images, ingredients, cooking instructions, and context) in this paper. The model that has been proposed has the potential to be extremely useful in both automatic recipe recommendations and information retrieval systems.

Paper Name: RECIPE RECOGNITION WITH LARGE MULTIMODAL FOODDATASET
Author: Xin Wang Devinder Kumar Nicolas Thome Matthieu Cord Fred´ eric Precioso.
Description: This paper manages programmed frameworks for picture recipe recogni-tion. For this reason, we look at and assess driving vision-put together and text-based innovations with respect to another exceptionally enormous multimodal dataset (UPMC Food-101) containing around 100,000 recipes for a sum of 101 food classifications. This dataset has one image and textual information for each item. Utilizing fusion of visual and textual information, we demonstrate extensive experiments with recipe recognition on our dataset. Moreover, we present examinations with message based implanting innovation to rep-disdain any food word in a semantical ceaseless space. Additionally, we compare the features of our dataset to those of a ETHZ university twin dataset: In order to highlight the similarities and differences between the two datasets, we revisit their data collection protocols and implement transfer learning strategies. Finally, we suggest a real application that can be used by everyday people to find recipes. Any mobile device can use this web search engine to send an image query to find the most relevant recipes in our dataset. A crucial technology for many food-related applications, including healthy diet monitoring, computational cooking, and food recommendation systems, among others, is food category classification. A novel image retrieval-based smart phone application is developed in [1] to record daily mealtime activities. They were able to conduct additional usage preference experiments [2] and food nutrition balance estimation [3] on the basis of this personal dietary data log system. Open Food System 2 aims to create new smart cooking appliances that can automatically monitor cooking settings for the best results and preserve cooked foods' nutritional and organoleptic qualities. Purdue University's Technology Assisted Dietary Assessment (TADA) project [4] aims to create a mobile food recorder that can accurately record daily food and nutrient intake from dietary data. Food classification characterization is a fundamental fixing in every one of these appli-cations. 2http://www.futur-en-seine.fr/fens2014/en/project/open-food-system-2/ In this paper, we concentrate on the development of automated systems for the recognition of image recipes.
For this purpose, we propose a new very large multimodal dataset (UPMC Food- 101) containing about 100,000 recipes for a total of 101 food categories collected from the web. One image and the HTML data—such as metadata, content, and so on—represent each item in this dataset. of the seed page from which the imageoriginated. We detail our initiative to build our dataset in sections 2 and 3 explain- ing the specificities and the originality of our dataset. We perform experiments at alarge scale to evaluate visual and textual features along with their fusion in section
We propose in section 5, further statistics to highlight dataset characteristics andcomparison with another recent large scale dataset (ETHZ Food-101 [5]). Finally, insection 6, we demonstrate the interest of these recognition technologies

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coupled withweb-based dataset in a mobile search application, which can receive food image as a query and return the most relevant classes and corresponding recipes

III. PROPOSED SYSTEM

External Interface Requirement

User Interface

Front End Software: Tkinder

Back End Software: DB SQlite

Hardware Interfaces:

As it is Python based application so it can run on any platform with minimumhardware RAM as well as Storage use Camera Module

Component:

Controller : Raspberry pi

Raspberry Pi : Raspberry Pi to acquire programming abilities, fabricate equipment projects, do home robotization, carry out Kubernetes bunches and Edge processing, and even use them in modern applications. Because of its power, adaptability, and ease of use, Python was specifically chosen as the primary language by the Raspberry Pi Foundation. Raspbian comes with Python already installed, so you can start right away. The power source: An electrical device that supplies electric power to an electrical load is known as a power supply. A power supply's primary function is to convert electric current.

Sensor : Buzzer :-

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Alarm systems, timers, trains, and confirmation of user input such as a mouse click or keystroke are all common applications for buzzers and beepers.

Camera

a piece of hardware inside the camera that captures light and converts it into signals which result in an image Millions of photosites, or light-sensitive spots, record what is seen in sensors.

Web camera (For desktop, Laptop's)

Software Interfaces:

Software Used Description Operating System As developed application shouldbe open source so we have chosen Python so it can run on any platform ratheron any Operating system Edge Detection Algorithm This algorithm is used todetect food Recipe so that user can see result of their captured food Recipe

NON FUNCTIONAL REQUIREMENT

Performance Requirements

The functions and each module's performance must be in good shape. The software's overall performance will allow users to work well. Data encryption should be performed quickly. Safety Requirement The application is designed in modules where errors can be detected steadily. The providing virtual environment should perform quickly. This makes it more straightforward to introduce and refresh new usefulness if required.

Safety requirement The application is organized into modules that make it simple to find and fix errors. This makes it simpler to install and update any necessary new features.

Attributes of Software Quality Our software possesses the following qualities: Adaptability: This product is versatile by all clients.

- Availability: Every user can download this software for nothing. The software is easily accessible to everyone.
- Maintainability: If an error occurs after the project has been deployed, the software developer can easily fix it.
- Reliability: The software's improved performance will improve the software's dependability.
- Convenience for Users: Since the software is a graphical user interface (GUI) application; the result gener-ated is a lot of easy to use in its way of behaving.

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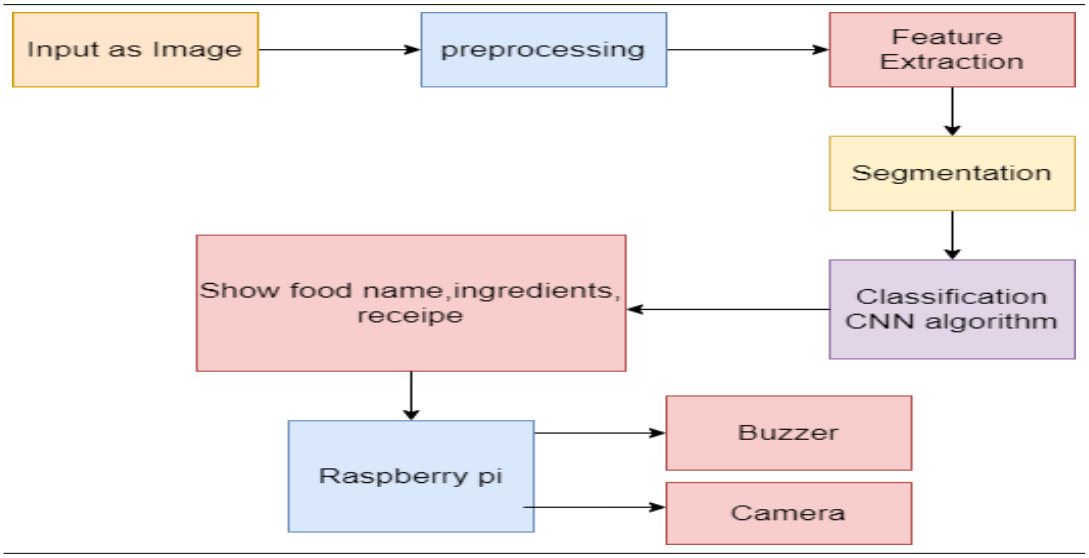
- Integrity: Uprightness alludes to the degree to which admittance to programming or information by unapproved people can be controlled.
- Security: To ensure dependable security, users are authenticated through multiple security phases.
- Testability: All aspects will be taken into account when testing the software

IV. SYSTEM ANALYSIS



Module

- Pre-processing
- Feature Extraction
- Classification

Data Flow Diagram

In Data Flow Diagram,we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system,In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like wise in DFD 2 we presentoperation of user as well as admin

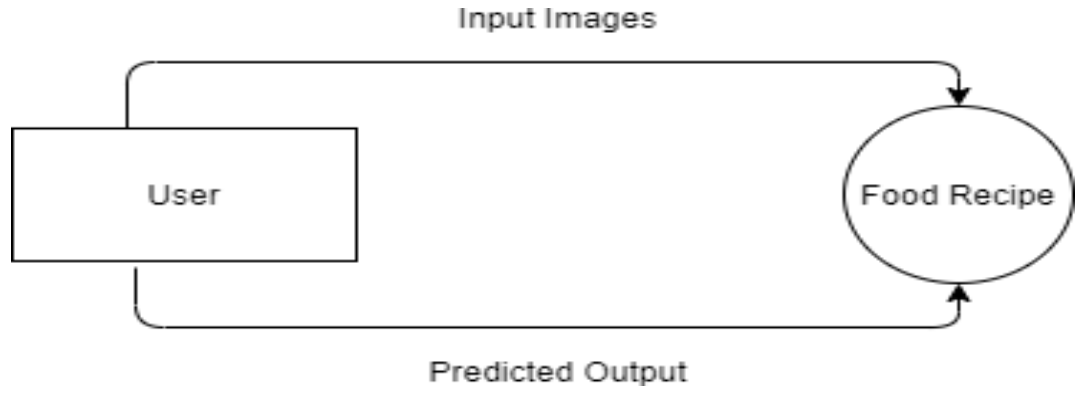


Figure: Data Flow dfd 0 diagram

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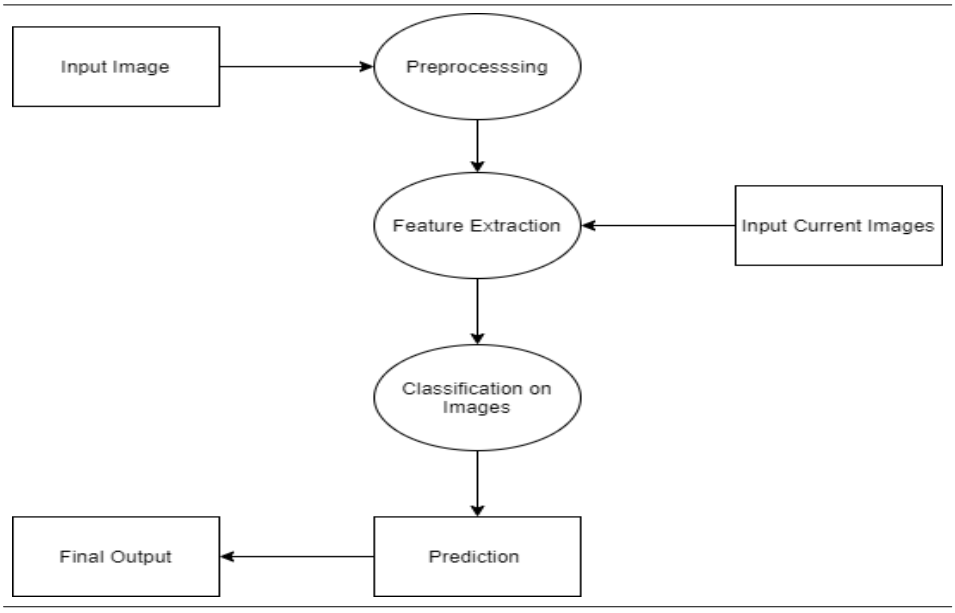

Figure: Data flow diagram

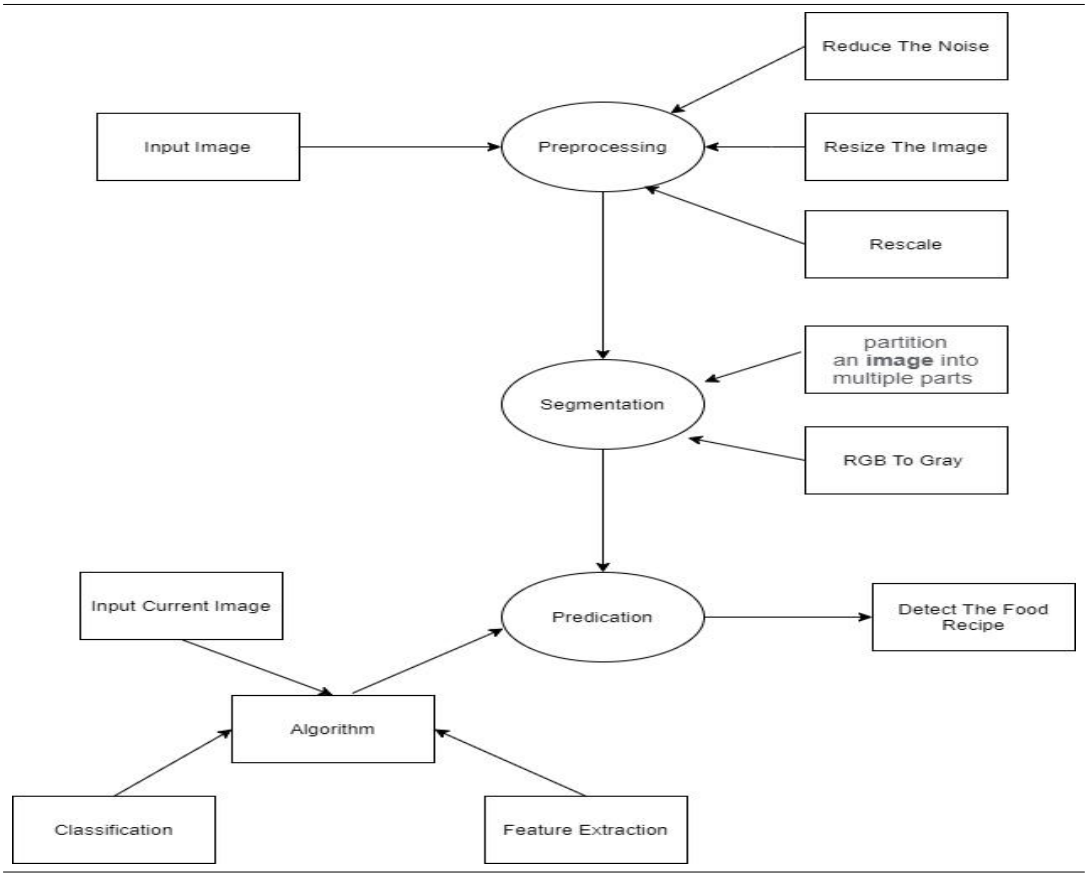

Figure: Data Flow dfd 2 diagram

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V. UML DIAGRAMS

Standard software blueprint writing language is Unified Modeling Language. The artifacts of a software-intensive system can be visualized, specified, constructed, and documented with the help of the UML.UML is process independent, although optimally it should be used in process that is use case driven, architecture-centric, iterative and incremen- tal. The Number of UML Diagram is available.

Use case Diagram.

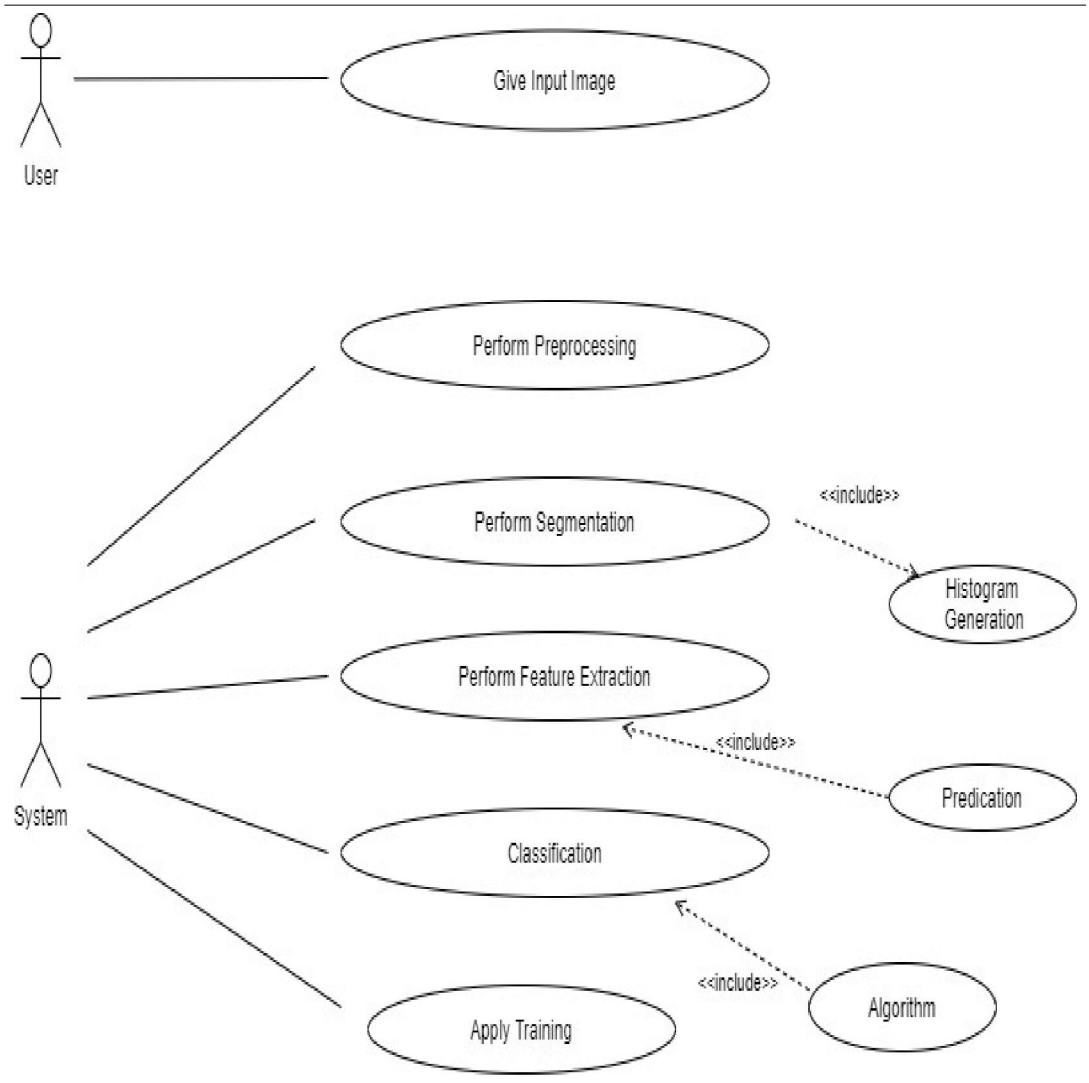

Figure: Usecase Diagram Diagram

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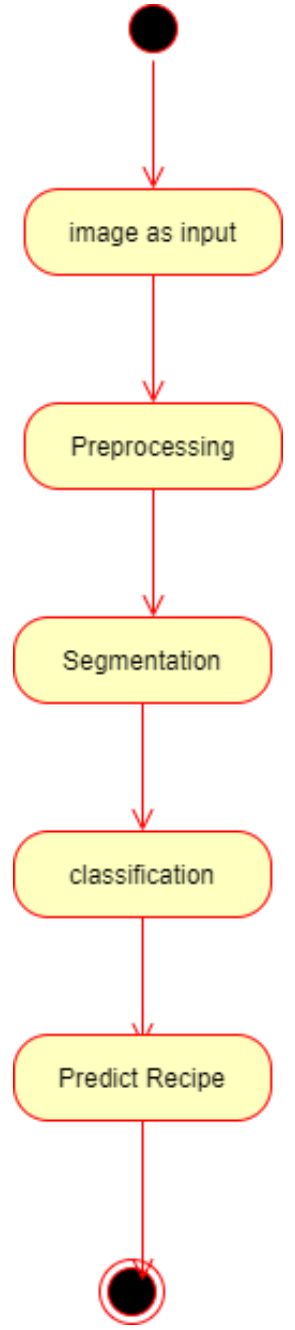

Figure: Activity Diagram

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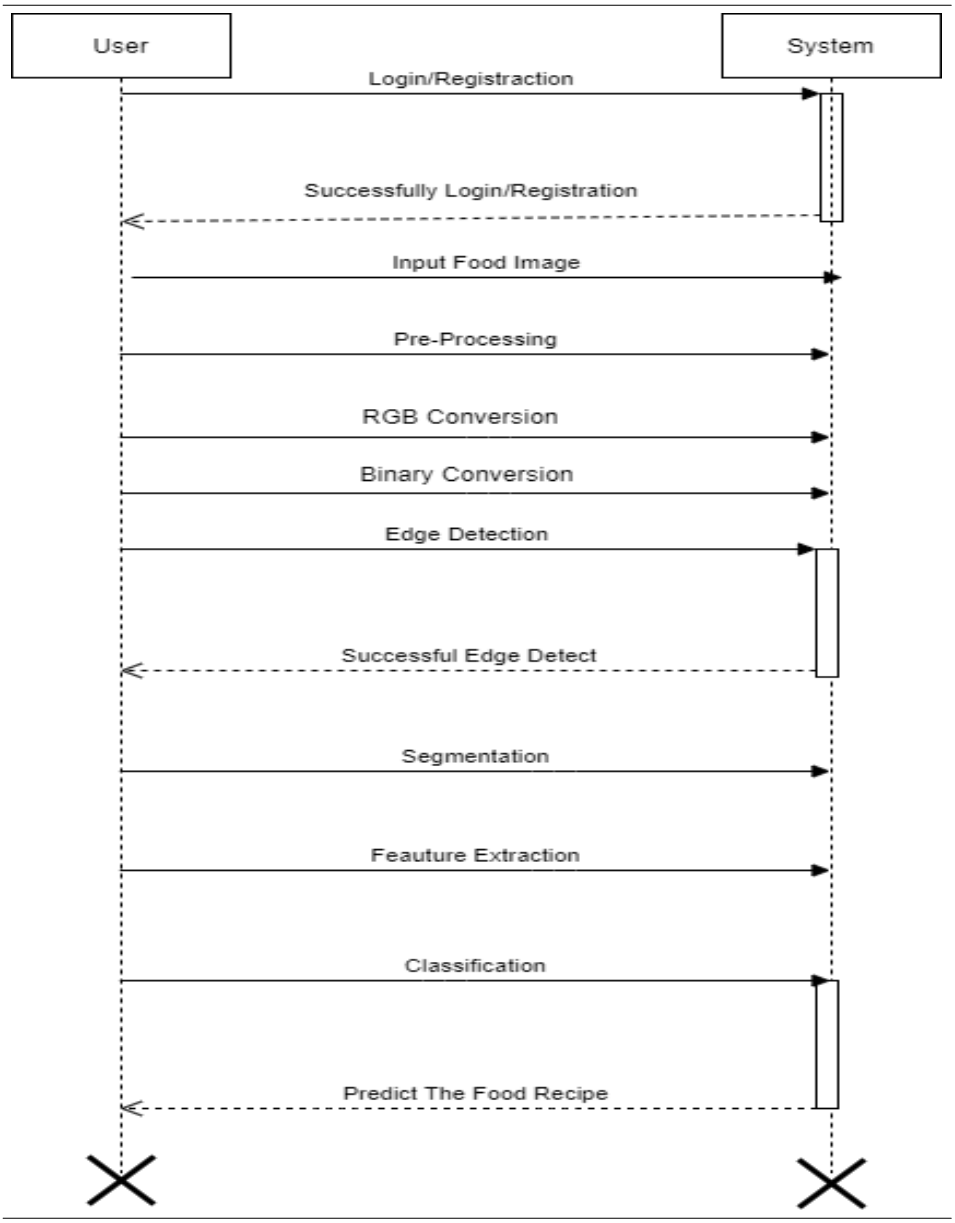

Figure : Sequence Diagram

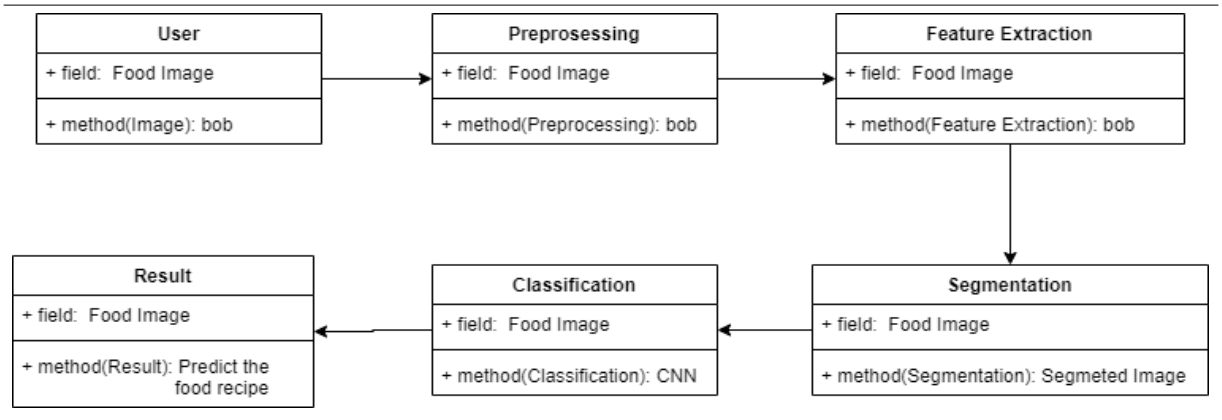

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Figure: Class Diagram

MATHEMATICAL MODEL:

Input =sF,D F:Food Image F1: Detect Food D: Display
D1:Show Food name and Recipe.
Procedure= F=F1 D=S1
F=OpenCV Library D=CNN Algorithm
F=Recipe Attribute Detected And Classify Recipe with Training Recipe. Output= Show the Recipe.

OVERALL DESCRIPTION

Productive Perspective

Different Food Recipe for It has different like panner tikka, dum-biryani, alu mutter etc.,
a. Tkinder GUI Based software
Tkinter is a graphical user interface (GUI) module for Python, you can make desktop apps with Python. You can make windows, buttons, show text and images amongst other things.

Product Features

With help of only camera module and hands we can perform different image opera- tions easily. With less distance and easy User interface we can perform food Recipe and see output on window

Operating Environment

Real time anaconda operates using: Algorithm: CNN Trained dataset of food Recipe:
.jpeg format (as it is in image format) Platform: Python User dependent and Single user system

Design and Implementation Constraints

Python, MySQL Database Connectivity
Assumptions and Dependencies
For e.g. if user is give input as food images: Firstly, user give input as food image then pre-processing on given input removing unwanted data, and feature Extraction and then classify the image using CNN. And give output

Real time setup

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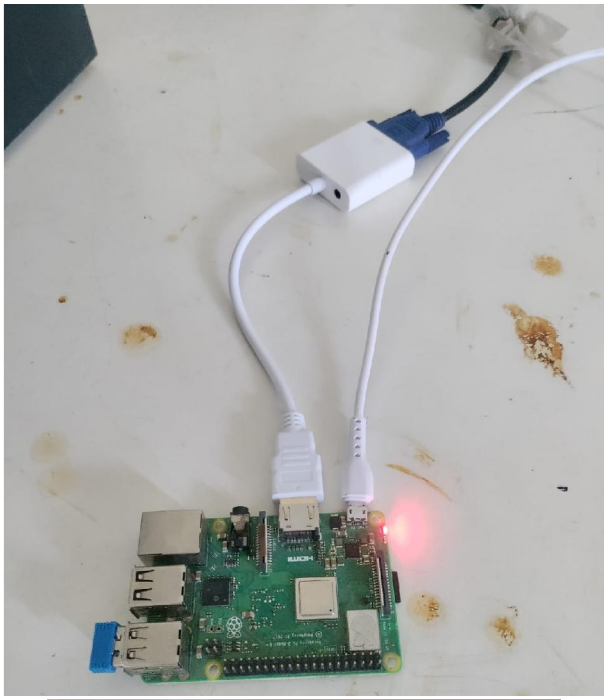

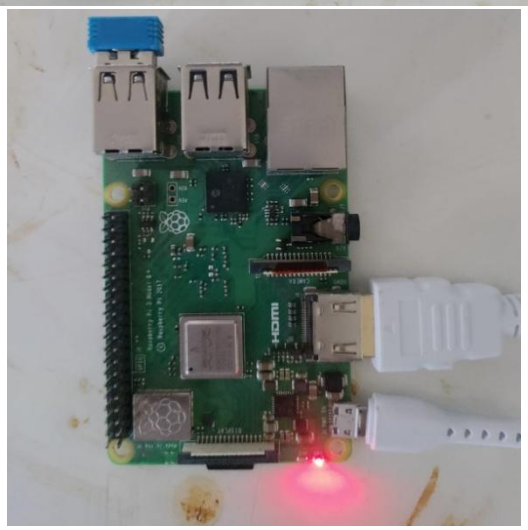

OUTPUT

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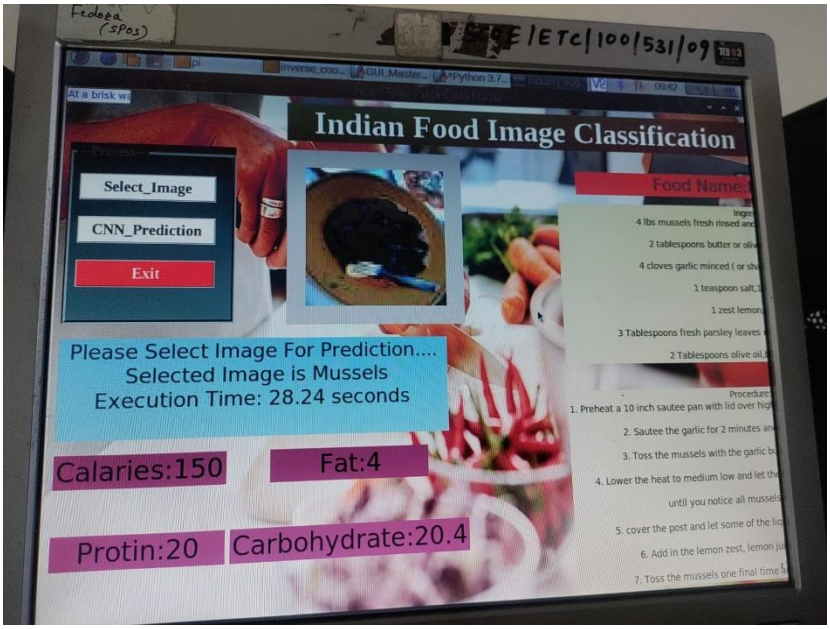

VI. FUTURE SCOPE

It supports users using android devices with 3.0 and upwards only.

Features like sharing recipes, quick access to favorite recipes, nutritional count, unit converter, etc. are expected in the future.

VII. CONCLUSION

The solution that was provided could be used by individuals, businesses, and hotels as well. A hosted application is being developed by us. so that the details are accessible to everyone from anywhere in the world. So this makes more straightforward to everybody. The application known as Food Recipe Management System will be hosted. So a client or guest can visit the application check for the recipes by utilizing picture handling.

ACKNOWLEDGEMENT

I am feeling very humble in expressing my gratitude. It will be unfair to bind the precious help and support which I got from many people in a few words. But words are the only media for expressing one's feelings and my feeling of gratitude is absolutely beyond these words. It would be my pride to take this opportunity to say thanks. We are thankful to Dr. M. B. Mali, HOD, Department of Electronics and Telecommunication, and all the STAFF MEMBERS for permitting us to carry on with our project work in the required college laboratories and use the instruments required for it. It is the love and blessings of my family and friends which drove me to complete this dissertation work.

Thank you all.

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