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[ijirset@gmail.com](mailto:ijirset@gmail.com)

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# Deep Learning Based Implementation of Food Nutritional Intake Tracking System Using Convolution Neural Network Algorithm

**Dr.J. Nafeesa Begum, S.Subavarsha**

Head of Department, Department of CSE, Government College of Engineering, Bargur, India

Student, Department of CSE, Government College of Engineering, Bargur, India

**ABSTRACT-** Nutrition is a necessary support for the development of the human body. Poor nutrition can result in reduced immunity, increased susceptibility to various diseases, and weakening of physical and mental development. This paper is based on deep learning that automatically detects the nutritional value of food and implements a precise system by which we determine whether the levels of nutrition in food increase the level of good or bad nutrition. On the initial page of the front- end design, click the first login page and select manual detection mode and auto-detection mode. Manual detection selects a fruit image that handles subtle edge detection, displays the original image that predicts the output, and displays the nutrition level on the console. Click Auto Detect and the input live camera will be turned on to detect whether the good food is bad food, and the output will be displayed on the console. Monitoring the nutritional value of their food intake and keeping daily health records. The nutrition level is stored in the database. The nutrient level should be compared to the database using a Convolutional Neural Network (CNN) algorithm. The collected data should be reviewed after this process is completed as the level of nutrition is good or bad. If nutritional levels are poor, try to eat more protein and fat and less simple sugars, and walk or engage in light activity to stimulate your appetite. It is the compilation of a healthy and balanced diet and is important for a healthy lifestyle. This technology is useful for generating a daily meal plan that aims to recommend foods highly preferred by the user that they have not consumed recently and that meet the human's daily nutritional requirements.

## I. INTRODUCTION

The main cause of obesity is a combination of excessive food consumption and lack of physical activity. Preliminary studies among adolescents suggest that innovative use of technology can improve the accuracy of young people's dietary information. When people get used to a sedentary lifestyle, they are involuntarily carried away by the fact that they are aware of the intake of energy from food. There is overwhelming evidence that the metabolic complications that are caused by obesity increase the risk of developing adverse health outcomes such as diabetes, blood pressure and dyslipidemia, and hypertension. In fact, there is a wide variety of nutritional information and guidance available to users. Fingertips. However, this information alone did not prevent diet-related illnesses or help patients eat healthily. So, maintaining a healthy diet is an important goal for many people. Accurate food calorie prediction is therefore equally important in such cases. In the past three years, object classification and detection capabilities have improved dramatically due to advances in deep learning and convolutional networks [6]. The use of this technology to accurately classify and detect food items is very important for a healthy and fit life. But always referencing the nutritional content of each food is an extremely tedious task [7]. CNN is now the state-of- the-art technique for image recognition challenges such as the Large-Scale Visual Recognition Challenge [8]. This methodology only works on simple food images, this methodology does not remove complex types of food such as soup, sandwiches, and so on, it only deals with direct food sources such as apples, bananas, and so on [9]. When working with such data, these methods have shown immense value. Deep learning has been widely studied as an effective machine learning algorithm [10]. The result is either a function or a classification output after the last layer has processed the data. When the model contains several layers in a row, the neural network is a deep neural network [11]. Food balance, an aspect of nutritional content, was estimated by image processing [12]. Deep convolutional neural networks have recently been used for food recognition [13]. The second uses deep learning, which is a recently popular method in the field of image recognition [14]. This makes food recognition a difficult task for which classical approaches do not recognize complex features. CNNs can easily identify these features automatically, thus increasing the classification accuracy [15].

## II. OBJECTIVE

Our goal with this document is to provide users with a convenient, intelligent, and accurate system to help them gain insight into the proper dietary intake of diabetic patients. In this paper, we implemented a basic CNN approach to food detection and recognition, which was the implementation of two processes, first image processing, and video processing. We used a rather unique combination of region-based segmentation and deep learning neural networks as a means to accurately classify and recognize good foods and estimate nutritional levels. We have shown that the combination of these two methods provides a powerful tool to achieve 99% accuracy in monitoring nutrient intake levels in our system.

## III. LITERATURE REVIEW

He proposed a model that focused on estimating the number of calories in a food by taking its image as input using SVM. The proposed model uses some image processing techniques followed by feature extraction. The authors designed a dataset, applied this dataset to some image processing techniques, then the processed dataset is applied to the feature extraction process. The features extracted from all the images are then applied to a support vector machine (SVM) classifier, which classifies the images into different classes as specified in the learning algorithm. , extracting the feature vector of the image, b. identifies the food in the image; C. predicts the calorie content of the food in the picture. The dataset contains images from the Pittsburgh Fast Food Image Dataset (PFID) and nutritional calorie information. For preprocessing, it includes background subtraction to remove noise and unnecessary information. [1] Google Net refers to the Inception architecture developed by Szeged et al., a deep convolutional neural architecture that was codenamed Inception. The goal of the input module is to act as a multi-stage feature extractor using 1×1, 3×3, and 5×5 threads inside one network module, then the result of that module. Network layer. It was designed for vision networks and coverage of the intended outcome with dense, easily accessible components. With a bit of module tuning, slight gains were seen compared to the other benchmark networks. Inception V3, the latest version was used to create the paper classifier. [2] He designed an automatic food detection system that detects and recognizes various Indian foods. The proposed food recognition system is developed to classify Indian food based on two different classification models i.e. SVM and KNN. The designed system uses combined color and shape elements. A comparative study of the performance of both classification models is performed. Parameters such as food density tables and color and shape recognition as part of image processing and classification using SVM and KNN were considered. The dataset contains a vector of features extracted from sample images. [3] Various food intake calculation apps have been developed to overcome manual work and erroneous data. One of the most recent technological advances to overcome the food image problem is a number of eHealth applications that have been developed to calculate food calories that use the concept of image processing. [4] We have implemented a semi- automated system that helps the dietitian to measure calories and daily nutrient intake for the treatment of obese and overweight patients. The system allows the user/patient to obtain food intake measurement results from an application that simulates the calculation procedure performed by a nutritionist [5].

## IV. EXISTING METHOD & PROPOSED METHOD

### EXISTING SYSTEM

The existing framework uses a Deep Convolutional Neural Network (DCNN), which is based on the Res Net 50 architecture. Due to limited computing resources for training the entire model, the ResNet model is simulated and pre-trained weights are imported. This section presents the proposed food recognition method based on ResNet50, which is one of the winning networks in the Image Net machine learning competition. The reason why the ResNet50 architecture is chosen over other architectures is the smaller parameter size. This makes loading the model and weights and training the model much faster. The solution includes preprocessing, training and classification. The training includes feature extraction and weight learning, which is performed in the Soft Max CNN layer. Classification is also done on CNN. In this existing system, food detection alone cannot estimate the nutritional level of food.

### PROPOSED SYSTEM

In this paper, we are designing a nutrition-tracking assistive system to help a person succeed in the fight against diet-related health conditions. Our proposed system is a deep learning-based system that allows the user to take a video of good food, and fruit and automatically measure the amount of nutrition received. To accurately identify the nutritional level of foods in the system, we use a convolutional neural network algorithm by comparing the nutritional level of good foods stored in the database. There are two types of testing manual detection and automatic detection, in the first manual detection we select an image, and after the original image is displayed, the output can be

predicted and displayed the nutrition level in the console. Automatic detection, we will capture an image through the camera showing its nutritional level and recommending that good food is bad. This paper also contributes to diabetic patients and recommends whether they should consume it or not. The need to have a system that measures the nutritional value of daily food intake and that the value of good nutritional values of food intake leads to daily health records. Therefore, we proposed a measurement method to estimate the number of nutrients from different images of good food. Collected data should be reviewed after the process is completed as the level of nutrition is good or bad. If the nutrition level is poor, it means you will try to eat more protein and fat, and if the nutrition level is lower, it means you will exercise.

V. BLOCK DIAGRAM

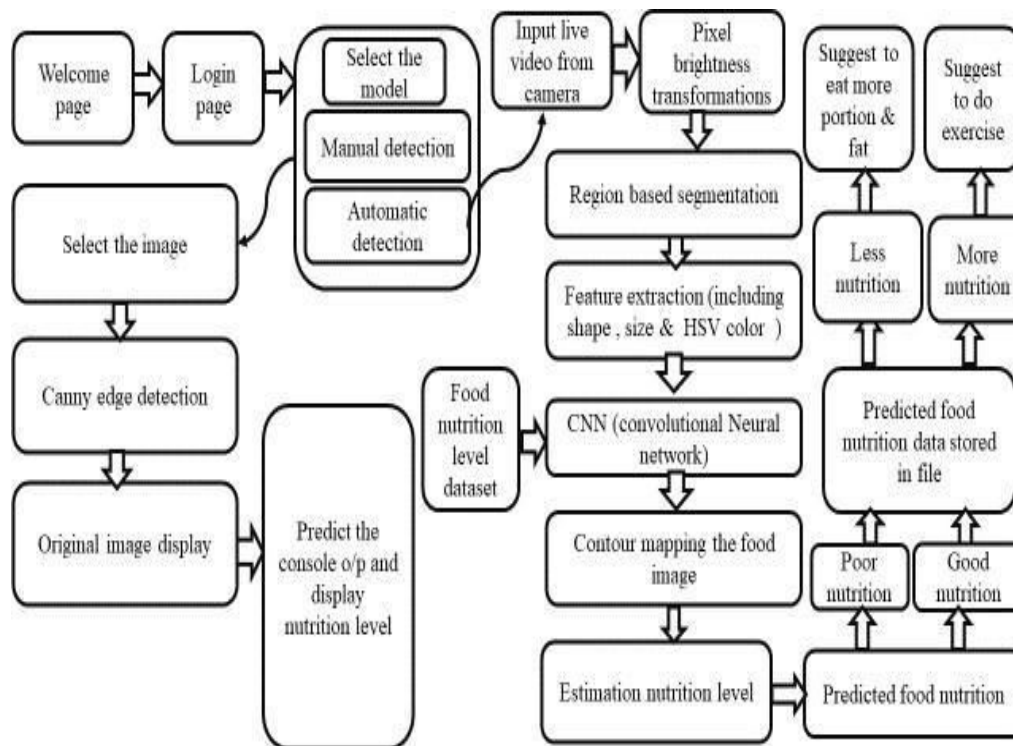


FIG NO.1. BLOCK DIAGRAM

VI. MODULE

1. **Welcome page:**  
It will design the first frontend welcome page, select manual detection mode and auto-detection mode for login page click.
2. **Manual detection:**  
In manual detection, we select an image, and after displaying the original image can be edge detection to predict the output and display the nutrition level in the console.
3. **Automatic detection:**  
Automatic detection will capture an image through the camera showing its nutritional level and recommending that good food is bad.
4. **Input acquisition module:**  
In this module, the input camera will capture video and multiple frames can be converted into a single frame and sent to the next block for further processing.
5. **Image Preprocessing and Segmentation Module:**  
A segmentation process will take place and the input image will be segmented for the purpose of detection, which is necessary to identify the region of interest in the image. This module will convert processed and segmented

images by performing a region-based segmentation process. It uses key factors in the image such as hue saturation value, descriptor points to analyze the complete content of the image.

**6. Feature Extraction Module:**

In this feature extraction module, features such as color, size, and shape can be extracted from an input food image.

**7. Dataset training module:**

The nutritional level of the fruit in the food data set can be stored in the database in advance. In this module, the system will use the CNN algorithm to retrieve the primitive features in the pre-stored data in the database and check the presence of these features in the input image.

**8. Nutrition Level Estimation Module:**

A convolutional neural network algorithm estimates the good nutritional level of foods by comparing a dataset of food nutritional levels in a database. By this estimate, the level of nutrition is good. Daily food intake data can be saved to a text file.

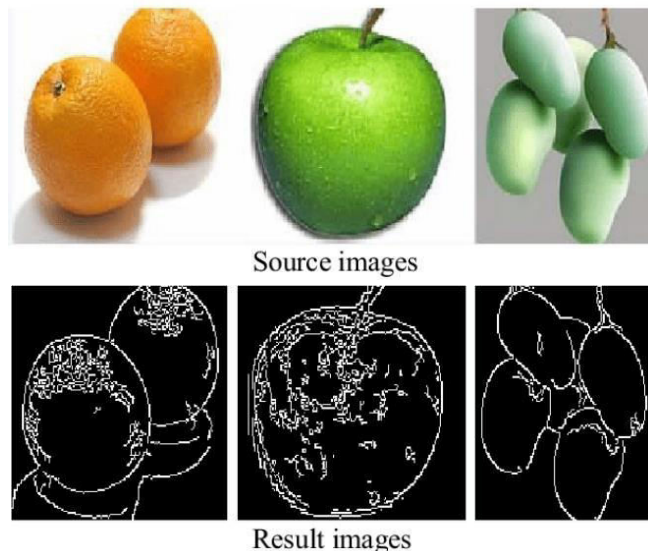
**9. Design Module:**

The collected data should be reviewed after 7 days when the nutritional level is good or bad. If the nutrition level is low, it means you will try to eat more protein and fat, and if the nutrition level is lower, it means you will exercise.

**VII. SYSTEM FUNCTION**

**1. CANNY EDGE DETECTION**

Canny edge detection is a technique for extracting useful structural information from various vision objects and dramatically reducing the amount of data processed. Canny found that the requirements for applying edge detection on different vision systems are relatively similar. Therefore, edge detection solutions to address these requirements can be implemented in a wide variety of situations. General criteria for edge detection include .Edge detection with a low error rate, which means that the detection should accurately capture as many edges as possible shown in the image the edge point detected by the operator should be located exactly in the center of the edge.



**FIG NO: 2 CANNY EDGE DETECTION**

**2. CONTOUR MAPPING**

A contour map is a type of map where the shape of the earth's surface is represented by contour lines, the relative spacing between these lines indicating the relative slope of a particular surface. The meaning of the contour map is quite clear to us, if we derive this definition further, it means - it is the delineation of any feature in the map, which is formed by the construction of lines. Lines are cut based on equal values of this property available as data points. In terms of a contour map, it can be said that contour mapping is a kind of topographic mapping, but for a

distinct study of this concept. A topographic map is a precise map that shows natural terrain as well as man-made objects such as buildings, roads, or bridges. While contour maps represent elevation changes using contour lines. Each of the contours marked on the map connects points with the same height. The contouring method cannot be completely relied upon because two researchers may produce different types of maps whenever there is an interpolation between two data.

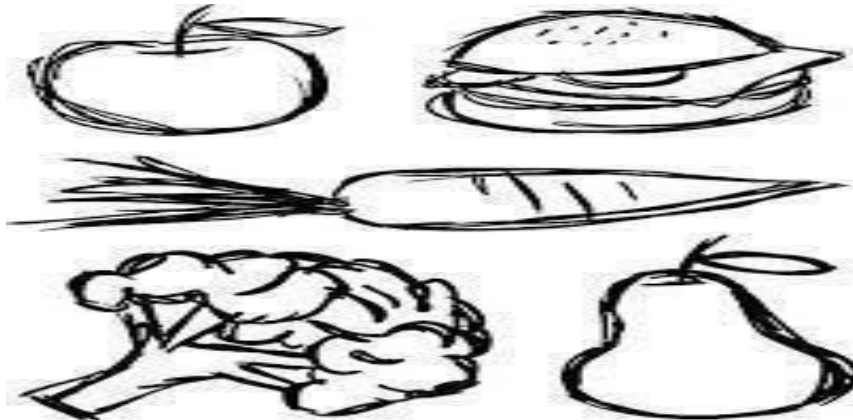


FIG NO: 3 CONTOUR MAPPING

### 3. FRUIT RECOGNITION

Recognition and classification of fruits and vegetables is not an easy task, not only because of the similar categories of fruits and vegetables, but also because of the lack of well-established and accessible databases. The number of training samples is small in some previous studies, which is not conducive to the scalability of the algorithm. Although there are well-established databases covering extensive categories, they are private and inaccessible. Our system is set up to efficiently sort fruit and help deliver the most accurate results possible. Deep learning techniques were used to create it. Fruit classification remains challenging in computer vision image recognition, given that fruits and vegetables can have similar colors, shapes, and textures. The FRUIT model is a typical CNN with high classification and recognition rates. It goes deeper than CNN's former traditional architecture.

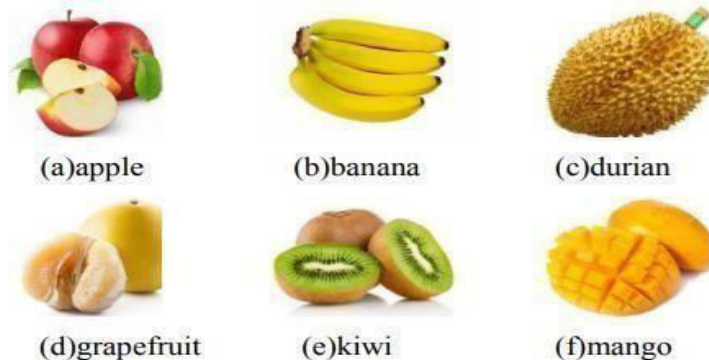


FIG NO: 4 FRUIT RECOGNITION

### 4. DATA SET TRAINING

In a small operation, network administrators or developers double as database administrators (DBAs). In larger enterprises, there may be dozens of database administrators specializing in many different aspects from design and architecture to maintenance, development, etc. No matter what part of IT you work in, you need to store data in one place or another. It doesn't hurt almost anyone to have some knowledge of databases and how they work. The goal of this tutorial is to provide a basic introduction. We will explain the basics of what a database actually is, look at the history, understand relational databases, get into some basic concepts from columns and rows up, touch on other types of databases, learn about some other concepts to understand, and wrap it all up in a quick overview of the major commercial systems on the market today.



FIG NO: 5 DATA SET TRAINING

### VIII.RESULTS

In this paper, we developed a practical deep learning-based good and bad food recognition system for diabetic patients. We modeled using deep learning techniques on the collected fruit, vegetable, and junk food image datasets. Here we detect good nutritional levels in fruits using CNN algorithm while processing live video. In two, we also detected the reaming of two foods, which are vegetables and junk food, in addition, create some CSV files and save the data in it for future analysis.

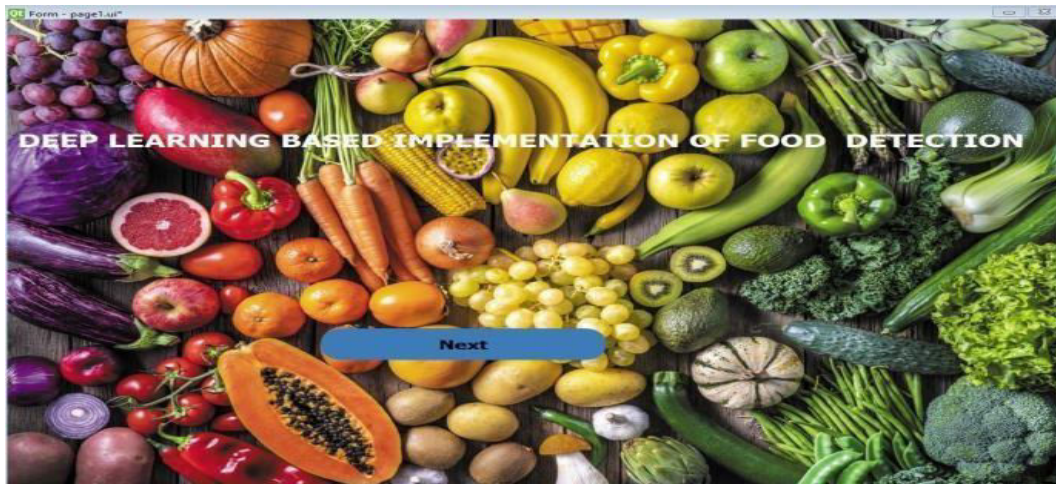


FIG.NO: 6 WELCOME PAGE FOR THE WEB APPLICATION



FIG.NO:7 LOG IN PAGE

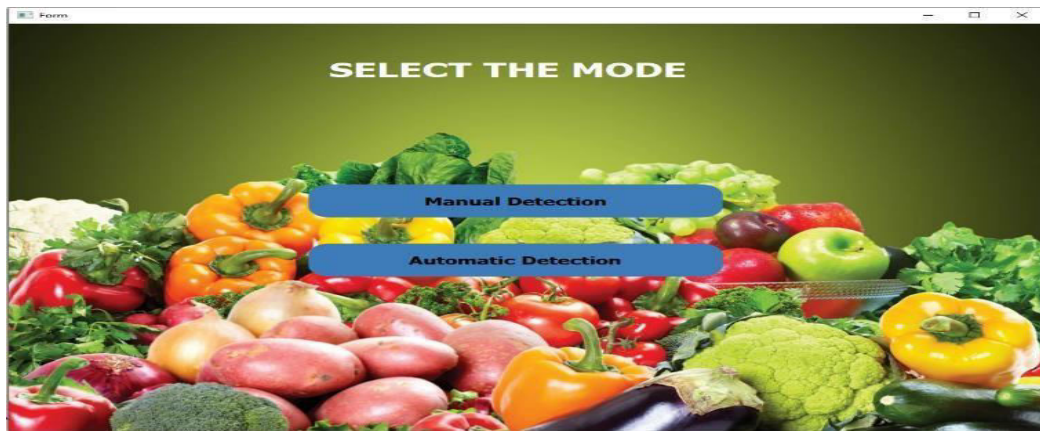


FIG NO: 8 SELECT THE MODE PAGE MANUAL DETECTION

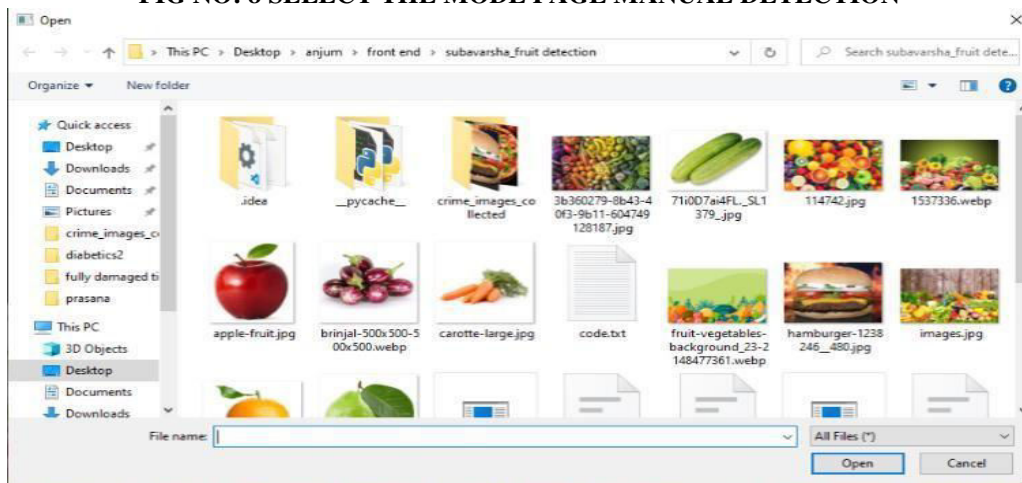


FIG NO:9 SELECT THE FOLDER

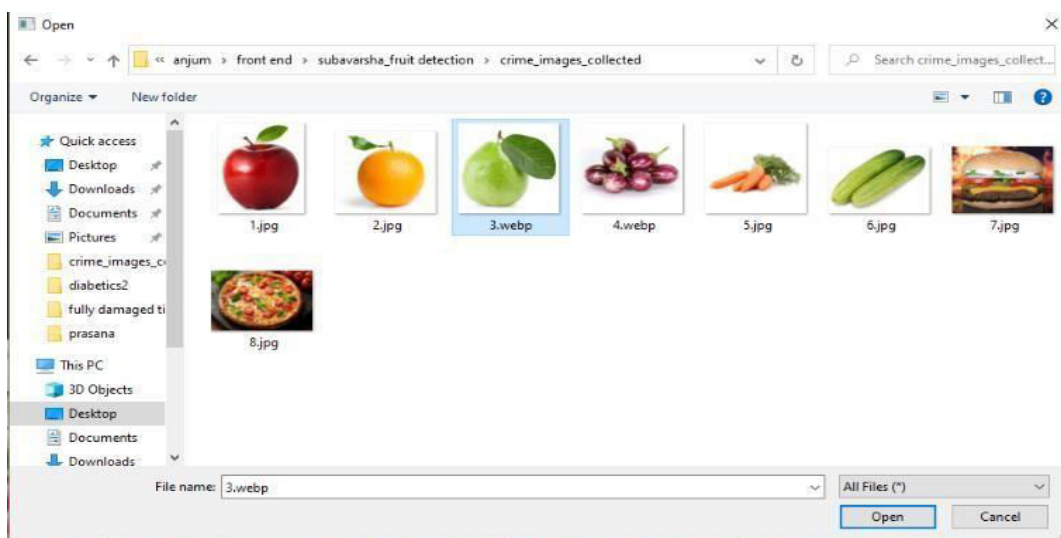


FIG NO: 10 SELECT THE DICTIONARY IMAGE





FIG NO: 11 CANNEY EDGE DETECTION

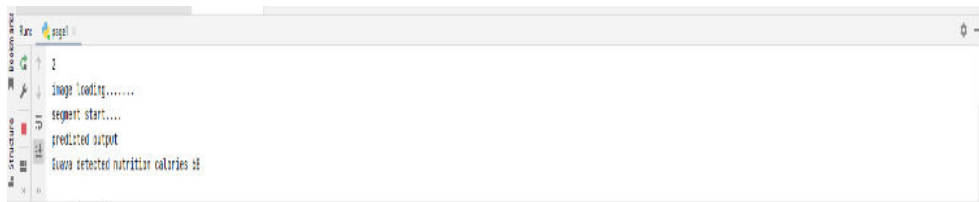


FIG NO: 12 OUTPUT DISPLAY IN CONSOLE AUTOMATIC DETECTION



FIG.NO:13 DETECT OF ORANGE NUTRITION LEVEL



FIG.NO: 14 DETECT OF APPLE NUTRITION LEVEL



FIG.NO: 15 DETECT OF BANANA'S NUTRITION LEVEL

## XI.CONCLUSION

A model based on a convolutional neural network is trained on a large number of food images, which improves the ability of your model to quickly acquire the desired features. In the analysis of the results, the accuracy of the training data set of the obtained images is about 99%. We can create a larger dataset that contains different food images to get a better result. The need to have a system that measures daily food intake for a healthy diet is crucial given the lack of knowledge of dietary and nutritional requirements and nutritional data for food intake can be stored in a text file. Therefore, we proposed a measurement method to estimate the number of calories from different food images by measuring features such as the color of the food from the image.

## X.FUTURE SCOPE

The resultant dietary profile represents a detailed view of a person's food intake and eating behavior that will provide the following benefits:

- Summaries of the individual's data for their personal use.
- Dietary data that is stored and made available for future research.
- Information that feeds into health professional consultations [e.g., enabling a dietician to get a better picture of an individual's overall intake and eating behavior so they can spend more time on behavior change techniques rather than having to assess diet as part of the appointment.

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