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Calorie Detection of Food Image based on SVM Algorithm

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Abstract: ***Nowadays, standard intake of healthy food is vital for keeping a diet to avoid obesity within the human body . In this paper, we present a totally unique system supported machine learning that automatically performs accurate classification of food images and estimates food attributes. This paper proposes a machine learning model consisting of a support vector machine that classifies food into specific categories within the training a part of the prototype system. The most purpose of the proposed method is to reinforce the accuracy of the pre-training model. The paper designs a prototype system supported the client server network model. The client sends an image detection request and processes it on the server side. The prototype system is meant with three main software components, including a pre-trained support vector machine training module for classification purposes, a text data training module for attribute estimation models, and a server-side module. We experimented with a selection of food categories, each containing thousands of images, and therefore the machine learning training to understand higher classification accuracy.***

Keywords: Image classification, Image Processing, Nutrition Estimation, Machine Learning, Support Vector Machine.

I. INTRODUCTION

Many people have already known that the food intake could affect our health. There are many reports that summarize about the acceptable daily amount of calories. However, it is difficult to do it practically. Health is one of the most important aspects of an individual's life. It takes some amount of effort from a person to stay in shape and maintain a healthy diet. The users, who lack of knowledge about nutrition, might be unable to know the amount of calories in each meal. Although they will ask experts to spot the quantity of calories, it's not convenient and that they couldn't conscious of the quantity of calories before meal. We started to study about the users' behaviour to develop the suitable method for calorie analysis. So that we have come up with a project to help the user track the number of calories which it takes in with the help of simple images of the food item. There are already many different apps and products available to do the same. In these application, the user inputs the ingredients and their amount which they are consuming. The application then search them in their database and calculate the calories present in them with values present in the database. Computer vision is also used to estimate the amount of calories present. The accuracy of these projects is determined by two factors, the accuracy of the object detection algorithm and the method to calculate the volume. We use a very extensive dataset of thousands of images of different types of food for our project. This gives our model an edge over other such projects. The accuracy of our model is also very high. We calculate the calories with the help of segmented image using formulas and probe object whose dimensions are already known.

II. RELATED WORK

Machine learning based approach on food recognition and nutrition estimation (2019).The author present a completely unique system supported machine learning that automatically performs accurate classification of food images and estimates food attributes. The system proposes a deep learning model consisting of a convolutional neural network that classifies food into specific categories in the training part of the prototype system [1].Calories analysis of food intake using image recognition (2014).Author presents a way of image processing to acknowledge images of food taken by users. From the input food images, the users can understand the quantity of calories they're going to absorb each meal by using the proposed algorithm. This method creates feature vector using several features about texture and color, then classify the food images using SVM [2]. Deepfood: food image analysis and dietary assessment via deep model (2020).During this method, an image of the food is first recognized as a sort of food, and ingredients of the recognized food are retrieved from the database with their nutrition knowledge and pattern of brightness and thermal image. The image is segmented into boundaries of ingredient candidates, and each one boundaries are then classified into ingredients using mathematical logic supported their heat pattern and intensities [3].Vision-based approaches for automatic food recognition and dietary assessment: a survey (2019).

During this paper, the recent vision-based approaches and techniques are widely explored to stipulate this approaches and methodologies used for automatic dietary assessment, their performances, feasibility, and unaddressed challenges and issues [4].The Design & Implementation of Ingredient-Based Food Calorie Measurement System Using Nutrition Knowledge and Fusion of Brightness & Heat Information. This paper proposes a method of ingredient-based food calorie measurement using nutrition knowledge and thermal information. In this method, an image of the food is first recognized as a type of food, and ingredients of the recognized food are retrieved from the database with their nutrition knowledge and pattern of brightness and thermal images [5].

III.PROJECT METHODOLOGY

In this project we propose system supported machine learning that automatically performs accurate classification of food images and detect calories. This processes system is an effective way to measure and mange daily food intake of user. The system will take the pictures of food and using image processing, segmentation and classification it calculates the nutrition and calorie content within the food. This project proposes a machine learning model consisting of a Support vector machine that classifies food into specific categories within the training a part of the prototype system. User upload food image and that we submit image as input to our training module for food detection. The proposed system will definitely improve and facilitate the present calorie measurement techniques. In this paper, food portion recognition system use for measuring the calorie and nutrition values. The user just to require an image of food image then to acknowledge the image to detect the sort of food portion and classify using support vector machine. We are performing segmentation, food portion recognition using skull striping and classification using support vector machine to calculate the calorie along side sort of energy in accurate way. We also give aware of user for top calories food. We use food dataset and calories dataset for predication.

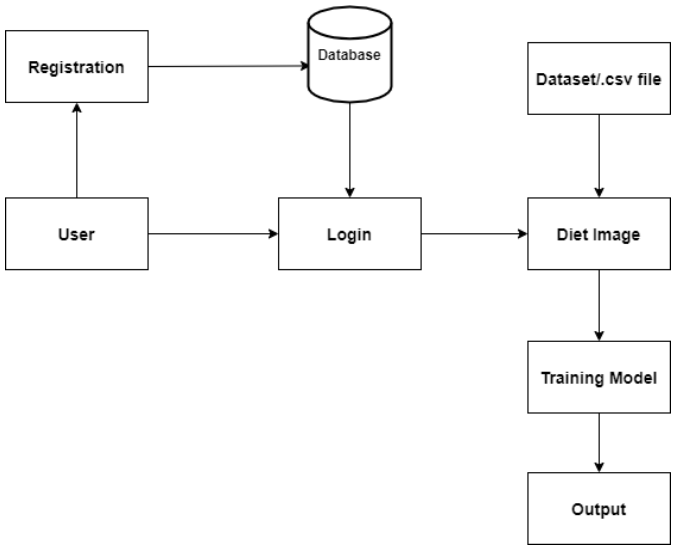


Fig-1 :System Architecture diagram

The diagram as given in figure 1 decribes the food image processing process of support vector algorithm.

1) *Registration of User:* This is the first step of implementing image identification where user has to registered to the database. The details of user ivolve name, email id, age. weight.
2) *Image Selection:* User has to select image from image gallery which is present in software or select from mobile phone.
3) *Classification:* The features of the processed real-time image are compared with the features images which are stored in the food image database. Classification is performed using Support Vector Machine classifier.
4) *Notification:* If match is found between the real time image and database image of food iamge than show the calories of food.

IV. ALGORITHM

SVM is one of the popular techniques used for data classification. A classification task usually involves training and testing data which consist of some data instances. Each instance in the training set contains one class label and several features. The goal of SVM is to produce a model which predicts target value of data instances in the testing set which are given only by their attributes. In our model, we use the Radial Basis Function Kernel (Linear), which maps samples into a higher dimensional space in a non-linear manner.

Unlike the linear kernels, the Linear kernel is well suited for the cases in which the relation between class labels and attributes is nonlinear. The feature vectors of each food item, extracted during the segmentation phase, will be used as the training vectors of SVM. For increasing the accuracy, after the SVM module has determined each food type, the system can optionally interact with the user to verify the kind of food items. The SVM module uses this information and classify the type of food. Also, as mentioned earlier, at this stage the system can ask the user to verify whether the food type classified by the SVM module is correct Classification with the Support Vector Machine has been done. The extracted features before revealed will be fed into the SVM classifier so that the classifier returns the food name as its output. For each feature, there will be training and testing phase. In fact, the aim of using the SVM in the FRS is to produce a system that can predict the board value of data cases in the testing set, which are just given by their features. The use of SVM method in this model contains color features. All the color features of each food item are extracted throughout the segmentation phase. At the same time, it will be used as training vectors for the SVM. This step is important to Calculate the amount of calories. Classification with the SVM provides the system with the type of food.

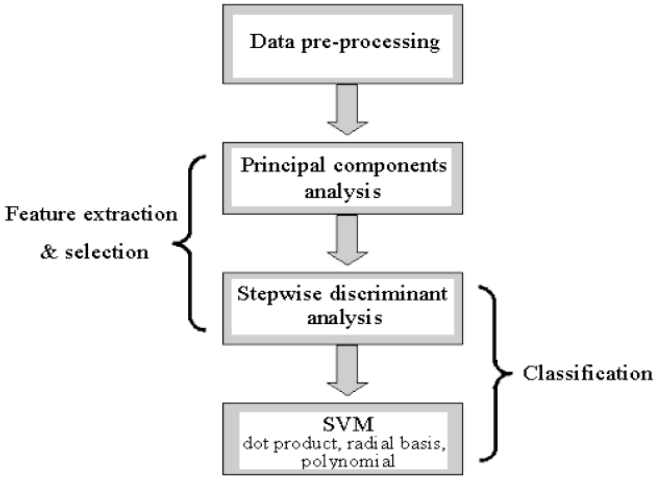
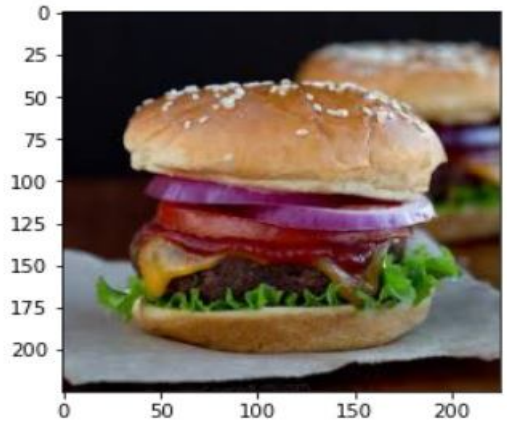


Fig-2 : Flow of algorithm

V. RESULTS

To calculate the calorie of food image system we need a group of images, meaning that the results are for a group of images. In this paper, we proposed a measurement method that estimates the amount of calories and Nutrition from a food image by measuring the food portions using support vector machine to measure the amount of calorie and nutrition of the food. And if Calorie or Nutrition one of the parameter is high in the image then it will shows that it is an energies food if not then low energies food. With that it will also show amount of calorie in given food.

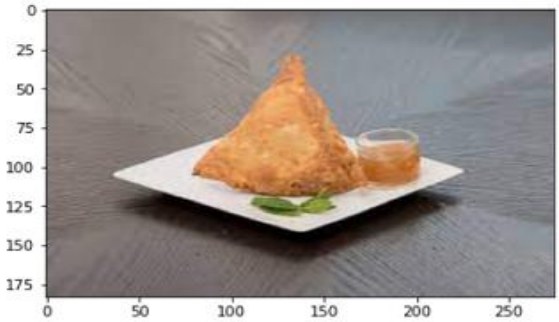



```
Burger = 27.180933212536416%
The predicted image is : Burger
```

Fig-3 : Burger

```
The predicted image is : Pizza
272 cal
Pizza = 25.316590409521446%
```

Fig-4. Pizza



```
The predicted image is : Samosa
107 cal
Samosa = 58.13769529929213%
```

Fig-5. Samosa

```
The predicted image is : Roti
198 cal
```

Fig-6. Roti

VI. CONCLUSIONS

In the implementation of calories detection of food image system supported image processing the comparative study of varied software scheme is completed . We identify food image, and that we proposed a system that use measurement method to estimates the quantity of calories from a food image and using nutritional facts tables to live the quantity of calorie and nutrition of the food. And calorie of food image is shown in final results with approximate value. This the paper is meant to dieticians for the treatment of over-weighted people, although normal people also can get enjoy our system by controlling their daily meal without fear about overeating and weight gain. this technique is straightforward and straightforward to use. Hence this technique is extremely important within the field of biomedical, the particular program is obvious and straightforward to know.

VII. ACKNOWLEDGMENT

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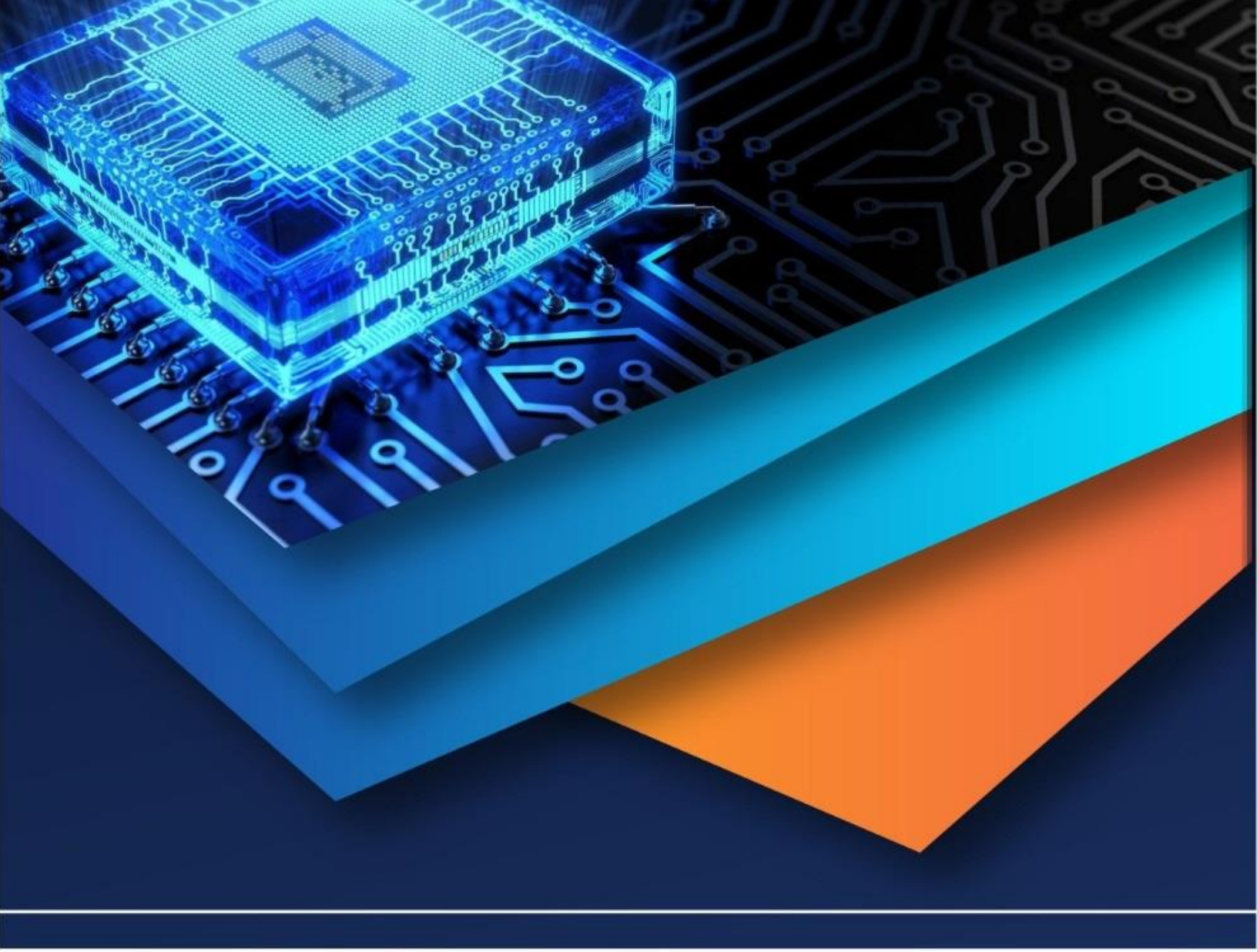

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