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MY DIETITIAN-MONITORING OF DIETARY HABITS BY MAINTAINING CALORIES COUNT THROUGH IMAGE PROCESSING

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ABSTRACT

Today people are more concerned about their daily calorie intake, as it creates several positive or negative impacts on the health based on its proportion. An unbalanced diet may cause many problems like weight gain, obesity, diabetes, high cholesterol, and heart attack. Even though the people can record their meal and discuss it with doctors or experts, it is not so convenient and they cannot know the number of calories before the meal. This system presents an effective way to measure and manage the daily food intake of the user. From the input food images, the users can understand the amount of calories they will take in each meal by using the Support Vector Machine (SVM) algorithm. The system uses several features like FCTH and CEDD that deals with the extraction of a new low-level feature that combines, in one histogram, Color and texture information. This features FCTH - Fuzzy Color and Texture Histogram and CEDD - Color and Edge Directivity Descriptor helps for appropriate retrieving images even in distortion cases to classify the food images. Based on the calorie count system recommend the user to keep body profile like fitness, reduce weigh or increase weight.

Keywords: Food Classification, Calorie Calculation, Calorie Consumption, Daily Intake, Support Vector Machine (SVM), Image Processing, Fuzzy Color And Texture Histogram (FCTH), Color And Edge Directivity Descriptor (CEDD).

I. INTRODUCTION

An unbalanced diet may cause many problems like weight gain, obesity, diabetes, high cholesterol, and heart attack. Even though the people can record their meal and discuss it with doctors or experts, it is not so convenient and they cannot know the number of calories before the meal. This system presents an effective way to measure and manage the daily food intake of the user. From the input food images, the users can understand the amount of calories they will take in each meal by using the Support Vector Machine (SVM) algorithm. The system uses several features like FCTH and CEDD that deals with the extraction of a new low-level feature that combines, in one histogram, color and texture information. This features FCTH - Fuzzy Color and Texture Histogram and CEDD - Color and Edge Directive Descriptor helps for appropriate retrieving images even in distortion cases to classify the food images. Based on the calorie count system recommend the user to keep body profile like fitness, reduce weigh or increase weight.

II. MODELING AND ANALYISIS

The main aim of this paper is to present a system that detect the type of food by cap- turing an image and provides total calorie content of that food using calorie content database. Figure 1 gives the architecture of the proposed system followed by the detail working of the system.

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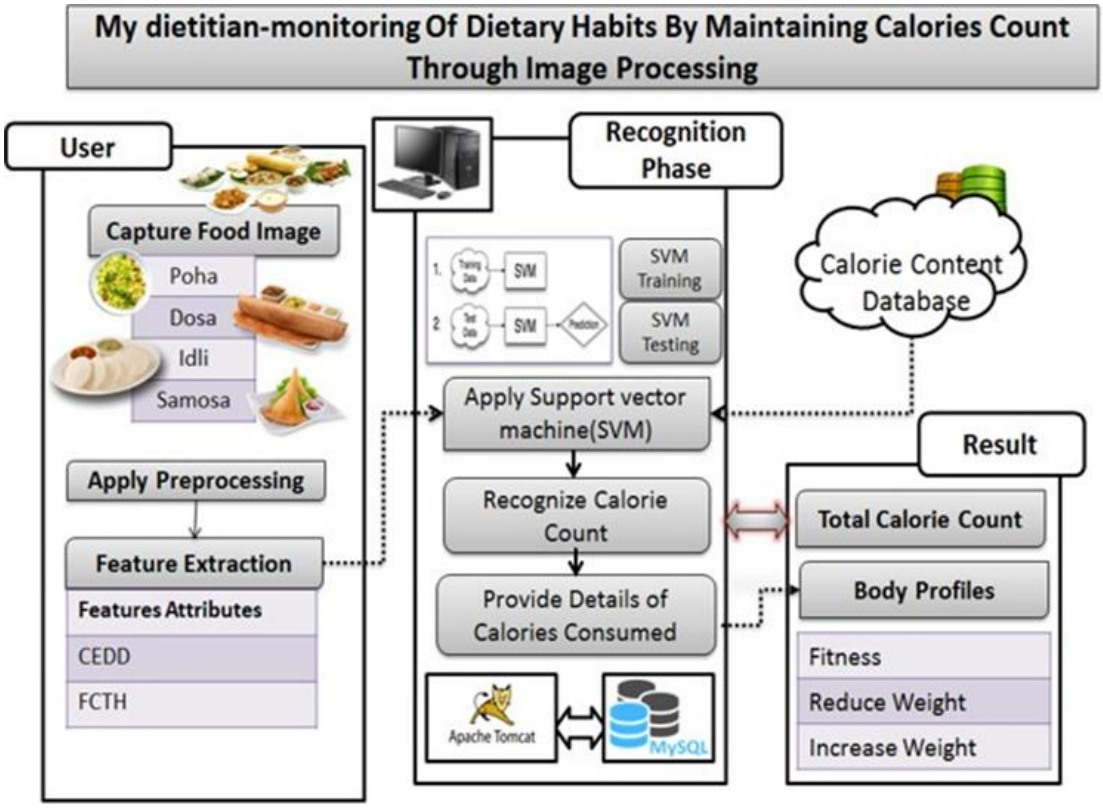

Figure 1: System Architecture

• Capture Food Image: The main aim of the proposed system is to measure and manage the daily calorie intake of the user as it has a great effect on the health of the user. Ideally, a person should have energy consumption in the following meals

– Breakfast: 20% (a fifth of your energy intake)
– Lunch: 30% (about a third of your energy intake)
– Evening Meal: 30% (about a third of your energy intake)
– Drinks and Snacks: 20% (a fifth of your energy intake)

So, to calculate the calories contents from the food, the user needs to take the food image first. Users should be able to search for a food item and take the different types of food images to find out their calorie content.

Pre-processing: The Captured food image may contain a lot of noise. By using noise removal techniques or removing any other disturbances present in the data, it is pre-processed to get the fine-tuned image. In this phase, the system can pre-process the input image. They check the image quality, size etc. Also, they resize the input image into fixed dimensions i.e., 128 X 128.

• Feature Extraction: From the pre-processed input image system can extract the features are as follows,

1. CEDD (Color and Edge Directivity Descriptor)
2. FCTH (Fuzzy Color and Texture Histogram)

These features are deals with the extraction of a new low-level feature that combines, in one histogram, color and texture information. This feature helps for appropriate retrieving images even in distortion cases to classify the food images.

• Classification: Once the features extracted and normalized, we train a Sup- port Vector Machine model for Food Image for food type recognition. The system detects the food type like poha, upma or idli using the SVM algorithm and calorie count for that particular food is given using the calorie content database.

• Diet Suggestion: The system provides details of calories consumed by the particular food and based on that it recommends different body profiles like if the user is fit, needs to reduce weight or increase weight. Food and calorie content are shown in the database.

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III. LITERATURE SURVEY

Ankita A. Podutwar et al.[1] provides a Food Recognition System for Calorie Mea- surement. Here users just take a picture of the food image then recognize the image to detect the type of food portion and classify using a support vector machine. Seg- mentation, food portion recognition using skull stripping and classification using support vector machine are used to calculate the calorie along with the type of en- ergy inaccurate way.

Natta Tammachat et al.[2] presents a technique of image processing to rec- ognize images of Thai food taken by users. From the input food images, the users gets the calory count in every meal by using the proposed algorithm. This technique generates feature vector using different features about texture and color, then classify the food images using SVM. The system can detect the food type and the number of calories.

S. Jasmine Minja et al.[3] presents a dietary management system that calcu- lates the calorie value of every food item. FCM algorithm is used here for segmenta- tion and Sphere Shaped SVM classifier is used to classify the segmented food items. This method automatically identifies the food items with 95% accuracy and then cal- culates their calorie value.

An effort has been taken by David Joseph Attokaren et al. in [4] to classify the images of food for further diet monitoring applications using convolutional neu- ral networks (CNNs). As the CNNs is able to handle large amount of data and can calculate the features automatically, they have been utilized for the task of food clas- sification. The standard Food-101 dataset has been selected as the working database for this approach.

Anita Chaudhari et al.[5] develop an application for estimating nutrition calo- ries and improve people's consumption conducts for health-care using CNN, which runs on mobile devices. A Fruit image dataset is used for capturing multiple images of a particular fruit, applied Convolutional Neural Network to the identification of 20 fruit objects, and calculated its presentation. After recognition, the algorithm fetches the nutrition values of the detected object and display it to the user.

Giovanni et al.[6] addresses the study of food image processing from the per- spective of Computer Vision. The author used the texture-based representation of food images and introduce new dataset UNICT-FD1200d for the study of food im- age representation.

Parisa Pouladzadeh et al.[7] introduce FooDD: a Food Detection Dataset of 3000 images that offer a variety of food photos taken from different cameras with different illuminations. Graph cut segmentation and deep learning algorithms are used for food detection. A dataset comprising 3000 food images is used for the classification of the food. Good distribution of single and mixed food images is one of the strong features of the given dataset.

IV. PROPOSED SYSTEM

To implement a system i.e.," My Dietitian-Monitoring of Dietary Habits by Main- training Calories Count through Image Processing" that helps to detect the type of food by capturing food image and provides total calorie content of that food using calorie content database with diet suggestion.

The proposed system can help to detect the food type from the food image captured by user like breakfast, lunch and dinner. The system uses CEDD and FCTH features in detection of the food type. The classification of food is carried out with the help of SVM classifier. The system also provides the calorie count of the particular food with the help of calorie content database. The system provides details of calories consumed by the particular food and based on that it recommends different body profiles to user.

The proposed system is an effective way to measure and manage the daily food intake of the user. From the input food images, the users can understand the amount of calories they will take in each meal by using the Support Vector Machine (SVM) algorithm.

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Use Case Diagram:

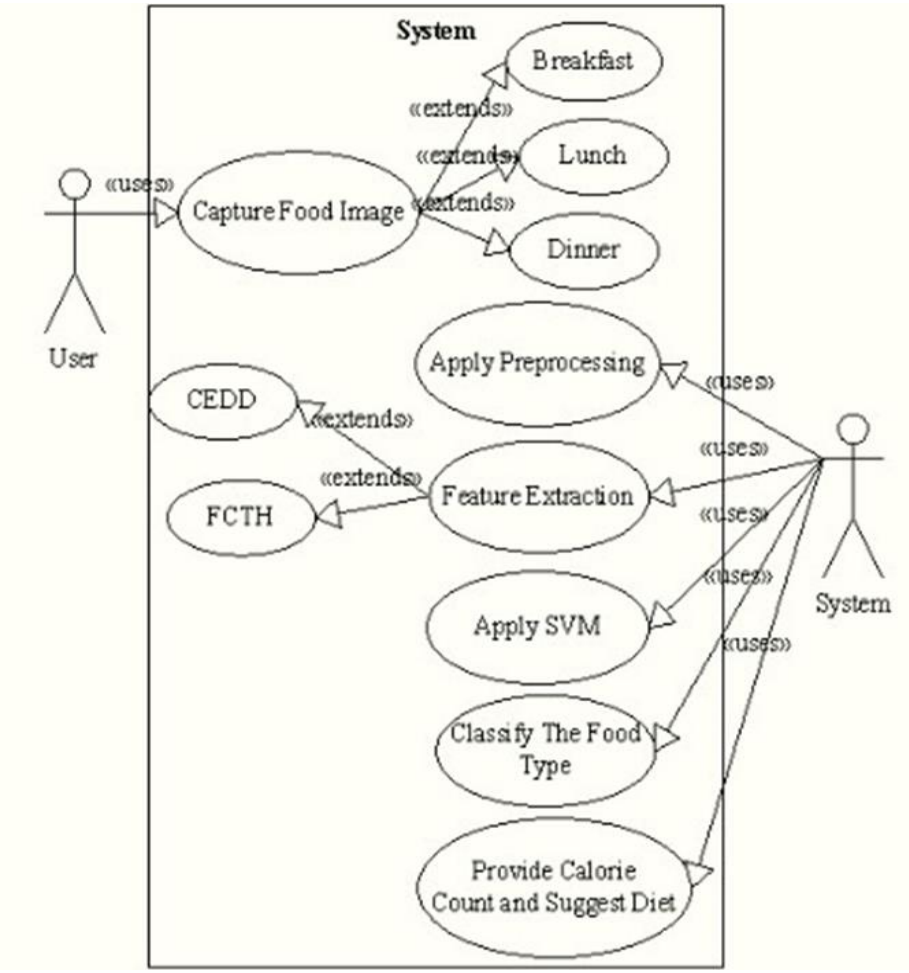

Figure 2: Use Case Diagram

V. CONCLUSION

This system presents an effective way to measure and manage the daily food intake of the user using image processing techniques. For that user first, take the image of the food and then by using the FCTH and CEDD feature we can detect the type of food using the support vector machine. The system also provides the calorie count of the captured food item. The system provides details of calories consumed by the particular food and based on that it recommends different body profiles like if the user is fit, needs to reduce weight or increase weight. Food and calorie content are shown in the database.

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