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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 important for keeping a diet to avoid obesity within the physical body. During this paper, we present a completely unique system supported machine learning that automatically performs accurate classification of food images and estimates food attributes. This paper proposes a deep learning model consisting of a convolutional neural network that classifies food into specific categories within the training a part of the prototype system. The most purpose of the proposed method is to enhance the accuracy of the pre-training model. The paper designs a prototype system supported the client server model. The client sends a picture detection request and processes it on the server side. The prototype system is meant with three main software components, including a pre-trained SVM model training module for classification purposes, a text data training module for attribute estimation models, and a server-side module. We experimented with a spread of food categories, each containing thousands of images, and thru machine learning training to realize higher classification accuracy.*

Key Words: **Food Recognition, Nutrition Estimation, Machine Learning, Deep Learning, Convolutional Neural Network**

1. 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. Nowadays it is very difficult for a person to track the calories consumed by them. The intake of calories plays a really vital role in one's healthy lifestyle. Earlier the users used to track their calories intake with the help of charts or timetable. Or they used to maintain a strict diet where the food item which has to be consumed was fixed along with its quantity. 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 various apps and products available to try to an equivalent. In these apps, the user inputs the ingredients and their amount which they're consuming. The apps then search them within 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 really extensive dataset of thousands of images of various sorts of fruit 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 assistance of segmented image using formulas and probe object whose dimensions are already known.

2. Literature Survey

A. Paper Name : Machine Learning Based Approach on Food Recognition and Nutrition Estimation

Author Name: Zhidong Shen, Adnan Shehzad, Si Chen, Hui Sun, Jin Liu

Description: Nowadays, standard intake of healthy food is important for keeping a diet to avoid obesity in the human body. In this paper, we present a completely unique system supported machine learning that automatically performs accurate classification of food images and estimates food attributes. This paper 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. The main purpose of the proposed method is to enhance the accuracy of the pre-training model. The paper designs a prototype system supported the client server model. The client sends a picture detection request and processes it on the server side. The prototype system is meant with three main software components, including a pre-trained CNN model training module for classification purposes, a text data training module for attribute estimation models, and a server-side module. We experimented with a spread of food categories, each containing thousands of images, and through machine learning training to achieve higher classification accuracy.

B. Paper Name : Calories Analysis of Food Intake Using Image Recognition

Author name: Natta Tammachat, Natapon Pantuwong

Description: In recent year, healthy may be a topic that folks concern. It is obviously that eating the food with high amount of calories cause several problems to our health. Recording the quantity of calories of the food intake in each meal is one among the stretchy to unravel such problem. Although the people can record their meal and ask doctors or experts, it's not so convenient and they cannot know the quantity of calories before the meal. This paper 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. Our method creates feature vector using several features about texture and colour, then classify the food images using SVM. In this study, we focused on Thai food. To train the SVM, we group the example food images by food type and therefore the amount of calories. We conduct the experiment to guages the performance of the proposed algorithm for both groups of example food.

C. Paper Name : Food calorie estimation using machine learning and image processing

Author name : Shaikh Mohd. Wasif, Swapnil Thakery, Amir Nagauri, Sheetal Ignatius Pereira

Description: In today's world a healthy lifestyle may be a must for each individual and what they consume is of utmost importance so as to realize an equivalent. Our paper focuses on creating software which provides the calorie of the food which the user goes to consume. So as to realize this, the software will take two images as input from the user, the highest view and therefore the view. The image will have a search object also which may be a coin whose volume are going to be known. The food item within the image are going to be detected with the assistance of Faster R-CNN algorithm. We are using Faster R-CNN algorithm since it's the fastest among all the thing detection algorithms. In Faster R-CNN we don't use selective search algorithm on the feature map to spot the region proposals, we use a separate network is employed to predict the region proposals. This makes it the fastest algorithm and thus it are often used for real-time object detection. Within the next step, we'll segment the image using the grab cut algorithm. It's needed for foreground extraction with minimal user interaction. After segmentation of images, the quantity of the food item is calculated using the known volume of the probe object. After the calculation of volume, the mass of the food item is calculated with the assistance of formulas then the calories of the food item are going to be calculated using the relation between mass and calories.

D. Paper Name : Vision-Based Approaches for Automatic Food Recognition and Dietary Assessment: A Survey

Author Name: MOHAMMED AHMED SUBHI, SAWAL HAMID ALI, MOHAMMED ABULAMEER MOHAMMED

Description: Consuming the right amount and right sort of food are the priority of the many dieticians and healthcare conventions. In addition to physical activity and exercises, maintaining a healthy diet is necessary to avoid obesity and other health-related issues, like diabetes, stroke, and lots of cardiovascular diseases. Recent advancements in machine learning applications and technologies have made it possible to develop automatic or semi-automatic dietary assessment solutions, which may be a more convenient approach to monitor daily food intake and control eating habits. These solutions aim to deal with the problems found within the traditional dietary monitoring systems that suffer from imprecision, underreporting, time consumption, and low adherence. 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.

E. Paper Name : Deep Food: Food Image Analysis and Dietary Assessment via Deep Model

Auther Name: LANDU JIANG, BOJIA QIU, XUE LIU, CHENXI HUANG, AND KUNHUI LIN

Description: Food is important for human life and has been the priority of the many healthcare conventions. Nowadays new dietary assessment and nutrition analysis tools enable more opportunities to assist people understand their daily eating habits, exploring nutrition patterns and maintain a healthy diet. In this paper, we develop a deep model based food recognition and dietary assessment system to review and analysed food items from daily meal images (e.g., captured by smartphone). Specifically, we propose a three-step algorithm to acknowledge multi-item (food) images by detecting candidate regions and using deep convolutional neural network (CNN) for object classification. The system first generates multiple region of proposals on input images by applying the Region Proposal Network (RPN) derived from Faster R-CNN model. It then identifies each region of proposals by mapping them into feature maps, and classifies them into different food categories, also as locating them within the original images. Finally, the system will analysed the nutritional ingredients supported the popularity results and generate a dietary assessment report by calculating the quantity of calories, fat, carbohydrate and protein. In the evaluation, we conduct extensive experiments using two popular food image datasets - UEC-FOOD100 and UEC-FOOD256.We also generate a new sort of dataset about food items

supported FOOD101 with bounding. The model is evaluated through different evaluation metrics. The experimental results show that our system is in a position to acknowledge the food items accurately and generate the dietary assessment report efficiently, which will bennet the users with a clear insight of healthy dietary and guide their daily recipe to enhance body health and wellness.

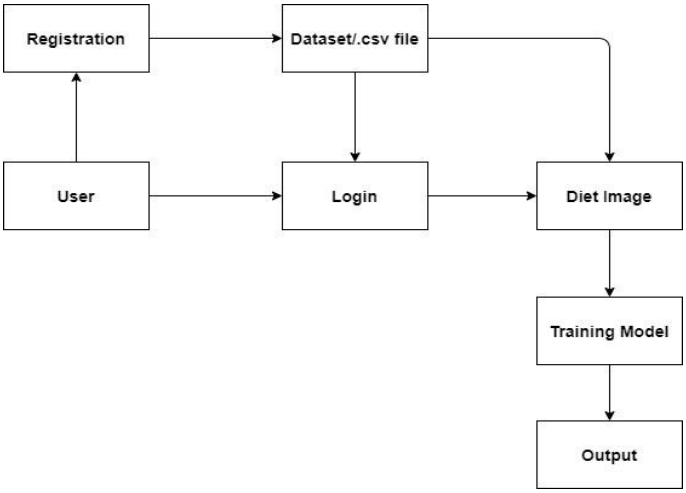
F. Paper Name : The Design and Implementation of an Ingredient-Based Food Calorie Measurement System Using Nutrition Knowledge and Fusion of Brightness and Heat Information

Auther Name: Sirichai Turmchokksam and Kosin Chamnongthai

Description: To measure the calorie of food which are varied relying on its ingredients and volume in each cooking time, it's required to sense and calculate calories of food before consuming. Supported nutrition knowledge, ingredients that are components of food naturally have different calories. This paper proposes how of ingredient-based food calorie measurement using nutrition knowledge and thermal information. 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 images. Simultaneously, 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. The classified ingredients from all boundaries are finally calculated for total calories supported area ratio and nutrition knowledge. The performance of the proposed method was evaluated with ten kinds of Thai curry during which all ingredients were complicatedly mixed, and thus the results showed 2.21% for software error and a couple of .28% for error.

3. PROPOSED SYSTEM

In this project we propose system based on machine learning that automatically performs accurate classification of food images and detect calories. This project proposes a machine learning model consisting of a Support vector machine that classifies food into specific categories in the training part of the prototype system. User upload food image and we submit image as input to our training module for food detection. We also give alert to user for high calories food. We use food dataset and calories dataset for predication.



4. CONCLUSIONS

In the implementation of Food Quantity Analyzation system based on image processing the comparative study of various software scheme is done. We identify food image. And we proposed a measurement method that estimates the amount of calories from a food's image and using nutritional facts tables to measure the amount of calorie and nutrition in the food. And calorie is shown in final results with approximate value. This the paper is designed to aid dieticians for the treatment of obese or overweight people, although normal people can also benefit from our system by controlling more closely their daily eating without fear about overeating and weight gain. This is simple and easy to use. Hence this system is very important in the field of biomedical, the actual program is clear and easy to understand.

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