NUTRITION ASSISTANT APPLICATION

ABSTRACT:

The ease with which food is being delivered at our doorsteps has lead to an outbreak of a major chronic disease known as obesity. As the necessity of the food arose among people, the apprehension related to their diet also simultaneously increased. In this paper we propose a calorie measurement system whereby the user is made to upload the image of food item and as a result, number of calories present in the uploaded food image will be predicted.

Using our application user can follow his/her diet routine, can maintain their fitness with ease.

LITERATURE SURVEY:

Evaluation of an Electronic Application for Nutritional Information in Food Service Outlets: A Pilot mHealth Application

Technological solutions provided to consumers with the aim of nutritional information, could be a major challenge of interaction among caterers and consumers. The purpose of this paper is to evaluate an Electronic Intelligent System of Personalized Dietary Advice called "DISYS" for tablets and smart-phones. This application provides nutritional analysis of menu items and personalized suggestions according to the nutritional demands of each customer. The DISYS application was characterized as an easy-to-use, comprehensive and useful tool. Volunteers consider that this application contributes to overall health by enabling the modulation of body weight throughout healthier choices, reduction of calorie intake and self-monitoring. Application of mHealth as such, designed to provide nutritional information, seems to be useful for customers as they recommend appropriate nutritional options. They seem also to be an effective tool for caterers and nutritionists, who can provide value-added services.

Reference:
https://www.researchgate.net/publication/311995942_Evaluation_of_an_Electronic_Application_for_Nutritional_Information_in_Food_Service_Outlets_A_Pilot_mHealth_Application

Real-Time Mobile Food Recognition System

We propose a mobile food recognition system the purposes of which are estimating calorie and nutritious of foods and recording a user's eating habits. Since all the processes on image recognition performed on a smartphone, the system does not need to send images to a server and runs on an ordinary smartphone in a real-time way. To recognize food items, a user draws bounding boxes by touching the screen first, and then the system starts food item recognition within the indicated bounding boxes. To recognize them more accurately, we segment each food item region by GrubCut, extract a color histogram and SURFbased bag-of-features, and finally classify it into one of the fifty food categories with linear SVM and fast toookernel. In addition, the system estimates the direction of food regions where the higher SVM output score is expected to be obtained, show it as an arrow on the screen in order to ask a user to move a smartphone camera. This recognition process is performed repeatedly about once a second. We implemented this system as an Android smartphone application so as to use multiple CPU cores effectively for real-time recognition. In the experiments, we have achieved the 81.55% classification rate for the top 5 category candidates when the ground-truth bounding boxes are given. In addition, we obtained positive evaluation by user study compared to the food recording system without object recognition.

Reference: https://www.cv-foundation.org/openaccess/content_cvpr_workshops_2013/W03/html/Kawano_Real-Time_Mobile_Food_2013_CVPR_paper.html

Machine Learning based SVM classifier and LLC :

It is a menu-match: restaurant-specific food logging from images. An image recognition framework based on the bag of visual words approach which extracts the base features from the images and then encoded with locality constrained linear coding (LLC). The extracted features are pooled using max-pooling in a rotation-invariant pooling scheme. A regression based method estimates the calories and along with feature representation mapped the feature space to

calories using Support Vector Regression. The approach is limited for discrete serving sizes andcustom menu and is also dependent on the GPSS of food consumption. The system lacks user customization and requires cost-sensitive learning to directly minimize calorie estimation errors during the training.

Quantification of food intake using food image analysis :

Measuring free-living peoples' food intake represents methodological and technical challenges. The Remote Food Photography Method (RFPM) involves participants capturing pictures of their food selection and plate waste and sending these pictures to the research center via a wireless network, where they are analyzed by Registered Dietitians to estimate food intake. Initial tests indicate that the RFPM is reliable and valid, though the efficiency of the method is limited due to the reliance on human raters to estimate food intake.

Reference: CK Martin, S Kaya, BK Gunturk - 2009 Annual International …, 2009 - ieeexplore.ieee.org

Regular shape food recognition with a camera phone

Zong et al.[2] proposes a food image classification method by means of local textural patterns and their global structure to describe the food image. The method uses a visual codebook of local textural patterns is created by employing Scale Invariant Feature Transformation (SIFT) interest point detector using the Local Binary Pattern (LBP) feature. The global structure of the food object is represented as the spatial distribution of the local textural structures and encoded using shape context. By using shape context to represent the relative spatial relationship between codewords, the proposed method can accommodate deformations and transformations in the shape of food objects. But this technique does not incorporate view invariant texture feature. Kong et al.[3] developed an automatic camera phone based multi-view food classifier named DietCam. DietCam uses probabilistic method to separates every food from multiple images.The recognition accuracy is increased through an enhanced joint distribution from every viewpoint. First for classifying food items from the images, they detect and extract local

feature points in every image and classify these features based on an existing feature database .They then increase the recognition accuracy through result verifications from multiple viewpoints. It considers the images are taken by three cameras at a synchronized time. A new technique has been introduced as perspective distance, which reflects the geometric relation between two features concerning their appearancesin all the possible perspectives. It shows an accuracy of84% for regular shape food items

Reference: S. Yang, M. Chen, D. Pomerleau, and R. Sukthankar, “Foodrecognition using statistics of pairwise local features,” in International Conference on Computer Vision and Pattern Recognition, 2010, pp. 2249–2256.