

**Measure Food Calorie Using Distance Estimation**Dhananjay Khade¹, Rakhee Wakhare², Shradha Dhumavat³, Karishma Sontakke⁴^{1,2,3,4}Department of Computer Engineering, D Y Patil School of engineering, Lohagoan

Abstract — As individuals across the world have become a lot of curious about looking at their weight, consumption healthier and avoiding blubber, a system which will live calories and nutrition in daily meals will be terribly helpful. High calorie intake within the body on the one hand, has evidenced harmful in varied occasions resulting in many diseases and on the opposite hand, a typical quantity of calorie intake has been deemed essential by dieticians to take care of the proper balance of calorie content in body. As such, researchers have projected a range of automatic tools and systems to help users live their calorie in-take. In this paper, we tend to propose a food calorie and nutrition measurement system which will facilitate patients and dietitians to live and manage daily food intake. Our system is constructed on food image process and uses nutrition truth tables. Recently, there has been a rise within the usage of private mobile technology like smartphones or tablets that users carry with them much all the time. Via a special standardization technique, our system uses the inbuilt camera of such mobile devices and records a photograph of the food before and when consumption it to live the consumption of calorie and nutrient parts. Our results show that the accuracy of our system is suitable and it'll greatly improve and facilitate current manual calorie activity techniques.

Keywords- Calorie Measurement, Deep Learning, Distance Estimation, Mobile Cloud Computing.

I. INTRODUCTION

As individuals across the world are getting additional fascinated by looking their weight, feeding more-healthy and avoiding fatness, a system which will live calories and nutrition in a day meals is terribly helpful. Recently, there has been a rise within the usage of private mobile technology like smartphones or tablets that users carry with them much all the time. Due the new rise in overweightness and fatness within the world and also the diseases they cause, a vital issue for individuals to keep up an honest quality of life these days is to look at their daily feeding routines so as to avoid excess calorie intake.

In our previous work, we've got developed a mobile system which will live the calories of the food from that food's image taken by the user's smartphone. Once the user captures the image of the food item on the plate, the image is distributed to the cloud for food recognition and calorie computation. Food recognition is finished by deep learning running within the cloud: the image is recognized and therefore the calorie details matching the image area unit fetched from the database that also exists within the cloud. The result's then prompted back to the user's phone. In our system, for calibration, the user needs to place his/her thumb close to the food once the food image is taken. In our system we've got used Support Vector Machine (SVM) for image process, MapReduce for the cloud model, and Volume calculation and finger activity for calorie calculation.

II. LITERATURE SURVEY**1. Measuring Calorie and Nutrition from Food Image (Aug 2014)**

Authors: P. Pouladzadeh, S. Shirmohammadi, and R. Almaghrabi

As people across the world have become a lot of fascinated by look their weight, consumption healthier and avoiding fatness, a system which will measure calories and nutrition in every day meals are often terribly helpful. During this paper, we tend to propose a food calorie and nutrition measure system that may facilitate patients and dietitians to live and manage daily food intake. Our system is constructed on food image process and uses nutritional truth tables. Recently, there has been a rise within the usage of private mobile technology like smartphones or tablets that users carry with them much all the time. Via a special activity technique, our system uses the inherent camera of such mobile devices and records a photograph of the food before and when consumption it to live the consumption of calorie and nutrient

parts. Our results show that the accuracy of our system is suitable and it'll greatly improve and facilitate current manual calorie measure techniques.

2. Using graph cut segmentation for food calorie measurement (2014).

Authors: Pouladzadeh, Parisa, Shervin Shirmohammadi, and Abdulsalam Yassine.

Calorie measuring systems that run on good phones permit the user to require an image of the food and live the quantity of calories mechanically. So as to spot the food accurately in such systems, image segmentation, those partitions a picture into completely different regions, plays a crucial role. In this paper, we have a tendency to present the implementation of Graph cut segmentation as a way of up the accuracy of our food classification and recognition system. Graph cut primarily based technique is well-known to be economical, robust, and capable of finding the most effective contour of objects in a picture, suggesting it to be an honest technique for separating food parts in an exceedingly food image for calorie measuring. During this paper, we offer the analysis of the Graph cut formula as applied to food recognition. We have a tendency to additionally perform variety of experiments wherever we have a tendency to used results from the segmentation part to the Support Vector Machine (SVM) classification model.

3. Mobile cloud based food calorie measurement. (2014, July)

Authors: Pouladzadeh, P., Kuhad, P., Peddi, S. V. B., Yassine, A., & Shirmohammadi, S.

Mobile-based applications became present in several aspects of people's lives over the past few years. Harnessing the potential of this trend for tending functions has become a concentration for researchers and business, above all coming up with applications which will be employed by patients as a part of their well-being, prevention, or treatment method. On the means, mobile cloud computing (MCC) has been introduced to be a possible paradigm for mobile health services to beat the ability problems across totally different data formats. In this paper, we have a tendency to propose a mobile cloud-based food calorie measuring system. Our system provides users with convenient and intelligent mechanisms that permit them to trace their food intake and monitor their calorie count. The food recognition technique in our system uses cloud Support Vector Machine (SVM) coaching mechanism during a cloud computing surroundings with Map cut back technique for distributed machine learning. The main points of the system and its implementation results area unit recorded during this paper.

4. Measurement of food volume based on single 2-D image without conventional camera calibration (2012).

Authors: Yue Y, Jia W, Sun M.

Food portion size measure combined with a database of calories and nutrients is vital within the study of metabolic disorders like avoirdupois and polygenic disease. In this work, we have a tendency to gift a convenient and correct approach to the calculation of food volume by measuring many dimensions employing a single 2-D image because the input. This approach doesn't need the standard board based mostly camera activity since it's taxing in observe. the sole previous necessities of our approach are: 1) a circular instrumentality with an illustrious size, like a plate, a bowl or a cup, is gift within the image, and 2) the image is taken underneath an inexpensive assumption that the camera is often control level with relevance its left and right sides and its lens is inclined down towards foods on the table. We have a tendency to show that, underneath these conditions, our approach provides a closed kind answer to camera activity, permitting convenient activity of food portion size mistreatment digital footage.

III. PROPOSED SYSTEM

We propose a food calorie and nutrition activity system which will facilitate patients and dietitians to live and manage daily food intake. Our primarily goal is foremost to acknowledge the image and so live the calorie. System is constructed on food image process and uses organic process reality tables. Our results show that the accuracy of our system is appropriate and it'll greatly improve and facilitate current manual calorie activity techniques. In our system, for standardization, the user should place his/her thumb close to the food once the food image is taken. For classifying the food object, we have a tendency to used deep learning that helped us reach high accuracy. For measure the calorie of the food object, we've got planned a replacement methodology whereby we have a tendency to use a novel approach for estimating the space from the food object followed by size standardization of the image for measure calories.

IV. OBJECTIVE

Our primarily goal is first to acknowledge the image so measure the calorie. For classifying the food object, we tend to used deep learning that helped us accomplish high accuracy. For measurement the calorie of the food object, we've got planned a brand new methodology whereby we tend to use a novel approach for estimating the gap from the food object followed by size activity of the image for measurement calories.

V. METHODOLOGY

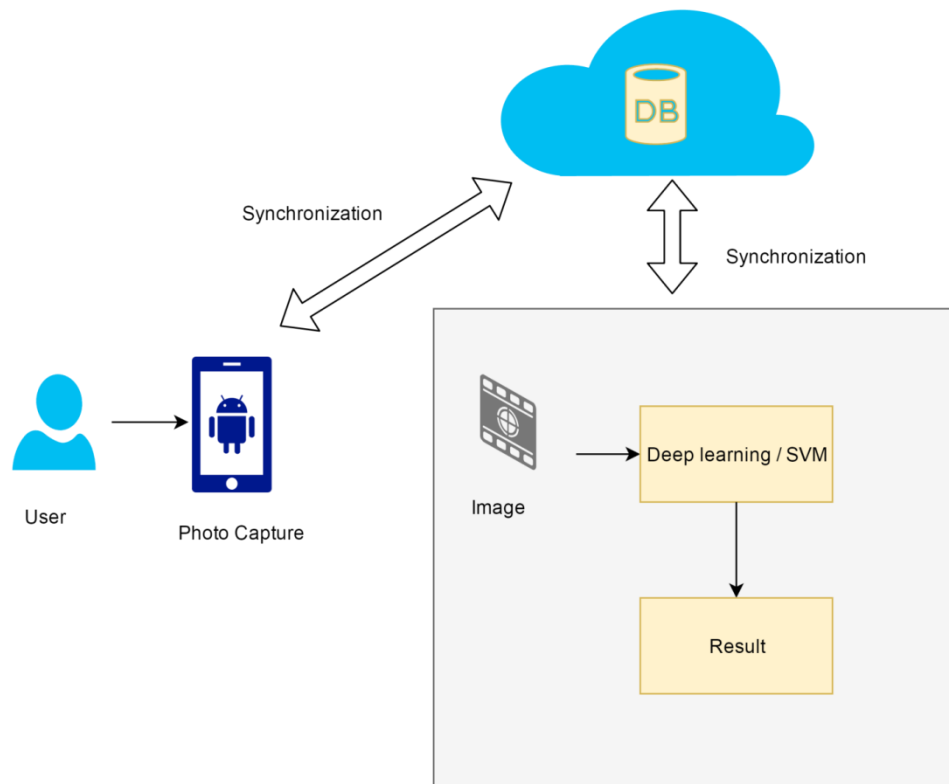


Fig 1: Architecture diagram of proposed system

As soon as the user captures the food object image, the system measures the gap of the food object from the phones camera and records it within the database. Once he/she clicks on the submit button for calorie estimation within the app, the system sends the image and therefore the distance (d) data to the cloud for image process and calorie activity steps. Throughout the image process stage, deep learning methodology is applied for the feature extraction and classification method. Once the food object is recognized and classified, the system then performs the calorie measuring step. The primary step of calorie measuring is to access the food content and its amount, present on the plate. We have a tendency to do that by getting contour round the food object with the utilization of clever edge detection. Once we have a tendency to acquire the contour, we have a tendency to contour space of the food object. The Arc length and contour are obtained from opencv functions; facilitate us confirm the dimension of the food object in pixels. We have a tendency to then performed regression analysis on the contour area and therefore the perimeter against the load. Normally we'd have used a weighing balance, to calculate the food amount.

As asking the user to weight the food object on the plate isn't possible in our situation, we have projected a completely unique plan to access the load of the food object present on the plate and further verify the calorie content of the food object. based on the image of a notable food object, if we are able to somehow calculate the dimension of this food object, given a point of reference, we are going to be sure enough be ready to acquire a quantitative worth are ready to dimension the food object and more acquire the closed food object in plate (in grams or milligrams) and more acquire its calorie worth. One in all the most challenges during this technique would be the belief that the user would forever follow the directions (like in our mechanical man Application, the user has to click the image from a particular distance

e.g. 50 cm). This may mitigate the interest of the usability of this application. Therefore to handle this downside, we have a tendency to propose a distance activity technique, which can modify the system to accurately calculate the calorie worth, no matter the changes within the distance from that the food object is being clicked. For doing thus, our primary goal was to see a continuing as a reference, with regard to the varied distance (d). We hence, created, equal sized blocks on the image with the assistance of grid lines. The blocks size would stay an equivalent for all pictures. A picture of bread is taken from a distance of forty five cm. equivalent bread is of the food object, the unit that wouldn't be in grams or milligrams however rather in centimeters or feet. We will then calibrate the weight of the clicked from 80 cm. Since the block size can stay constant, the system then calculates the entire range of blocks from pictures that was taken from varied distance. we will confirm that with the increasing distance, the entire range of blocks decreased.

5.1. Deep Learning Method

We have implemented a deep learning technique that permits the system to determine the food options supported color, contour, texture and size to classify the food precisely. We tend to were thus able to come through higher accuracy results throughout the classification stage as compared to our previous approaches (such as Support Vector Machine). The Deep Learning approach is in continuation to what has been achieved as a part of that previous work, with the deep learning technique, initial we tend to train our food pictures with a deep neural network, so we tend to generate the model file. Anytime the user submits a food image for calorie measuring, the system performs segmentation and extracts options, that square measure any written into hidden layers within the deep neural network. Once customizing the superior feature layer, we tend to are able to generate the classification results. The small print are delineate next.

5.2. Support Vector Machine (SVM) for image processing.

In machine learning, support vector machines (SVMs, conjointly support vector networks) learning models with associated learning algorithms that analyze information used for classification and multivariate analysis. Given a group of coaching examples, every marked for happiness to 1 of 2 classes, Associate in Nursing SVM coaching rule builds a model that assigns latest examples into one class or the opposite, creating it Associate in Nursing non-probabilistic binary linear classifier. Associate in Nursing SVM model could be an illustration of the examples as points in house, mapped so the samples of the various classes are divided by a transparent gap that's as wide as doable. New examples are then mapped into that very same house and foretold to belong to a class supported that facet of the gap they fall on.

5.3. Back-propagation algorithm

The back-propagation algorithmic rule is that the quick approach of computing the gradient of the price operates. Coaching the deep neural network can permit us to form the mandatory changes to the burden and bias, while not majorly moving the output of the network and giving us the required results. For instance, this rule can facilitate us tweak the weights (w) and bias (b) throughout the educational section, in a very means we will finally verify the output joined of the two (apple or cherry), while not effecting the remainder of the food categories. Delta amendments in either the weights or the bias can change the result from one food category to the opposite. Considering we've got taken the color feature under consideration, any changes within the weight of w or bias b would create the little changes to the ultimate results, that during this case between apple and cherry (having nearly same color features) can alter the ultimate result. If the chance of the image, it'd be classified as Apple and same is that the case with any food kind.

V. CONCLUSION

This paper shows a technique of estimating a user's everyday energy expenditure employing a 3-axis measuring instrument of an itinerant phone. we have a tendency to initial infer the user's posture supported the acceleration device reading and calculate METS worth, that is taken into account as a live for estimating calorie consumption for daily activities. The experimental result shows that our application is as correct as a reference device.

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