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IMG2 CALORIES

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ABSTRACT
Measuring Calories and Nutrition from food image its objectives. measure the food is extremely vital for a productive healthy diet. Smartphone plays an important role in today's technological world exploitation this system can enhance the problem in intake of dietary consumption during this paper, A food calorie and nutrition mensuration system that may facilitate patients and dietitians to live and manage daily food intake. Our system is made on food image process and uses organic process reality tables. Recently, there has been a rise within the usage of non-public mobile technology like Smartphone's or tablets, that users carry with them much all the time. At the first stage, pictures square measure taken by the user with a mobile device followed by a pre-processing step. Then, at the segmentation step, every image is going to be analysed to extract numerous segments of the food portion. live calories and nutrition in a day meal, Uses the constitutional camera of such mobile devices and records a photograph of the food before and when ingestion it to live the consumption of calorie and nutrient element

Keywords: Calorie measurement, Food image, Obesity, Healthy Diet, Nutrition, Smartphone.

I. INTRODUCTION

Measuring Calories and Nutrition from food image its objectives. As folks across the world are getting additional curious about look their weight, uptake additional healthily, and avoid avoirdupois, a system which will live calories and nutrition in daily meals is terribly helpful. A food calorie and nutrition measure system which will facilitate patients and dietitians to live and manage daily food intake. Our system is constructed on food image process and uses biological process truth tables. Recently, there has been a rise within the usage of non-public mobile technology like smartphones or tablets, that users carry with them much all the time [1]-[9]. Via a special activity technique, our system uses the inbuilt camera of such mobile devices and records a photograph of the food before and when uptake it so as to live the consumption of calorie and nutrient parts. The results show that the accuracy of system is appropriate and it'll greatly improve and facilitate current manual calorie measure techniques.

Obesity in adults has become a significant downside. someone is taken into account rotund once the Body Mass Index is above or adequate to thirty (kg/m2). In 2008, over one in 10 of the world's adult populations were rotund, however in 2012 this figure has up to 1 in six adults, associate degree dismaying rate. Recent studies have shown that rotund individuals are a lot of probably to possess serious health conditions like cardiovascular disease, heart failure, sort II polygenic disease, high cholesteric, breast and carcinoma, and respiration disorders [10]-[22]. the most reason for fatness is that the imbalance between the quantity of food intake and energy consumed by the people. So, so as to turn in a very healthy manner, similarly on maintain a healthy weight for traditional individuals, the daily food intake should be measured. In fact, all existing fatness treatment techniques need the patient to record all food intakes per day so as to match the food intake to consumed energy. But, in most cases, sadly patients face difficulties in estimating and mensuration the quantity of food intake thanks to the self-denial of the matter, lack of biological process data, the manual method of writing down this data (which is deadening and might be forgotten), and different reasons [23]-[34].

As such, a semi-automatic observance system to record and live the quantity of calories consumed during a meal would be of nice facilitate not solely to patients and dietitians within the treatment of blubber, however conjointly to the common calorie-conscious person. Indeed, variety of food intake mensuration ways are developed within the previous couple of years. But, most of those systems have drawbacks like usage difficulties or giant calculation errors. what is more, several of those ways are for experimental practices and not for real world usage, as we have a tendency to shall see within the section II . during this paper, a private code instrument to live calorie and nutrient intake employing a smartphone or the other mobile device equipped with a camera. Our system uses image process and segmentation to spot food parts (i.e., uninflected parts like chicken, rice, vegetables, etc., from the general food image), measures the amount of every food portion, and calculates biological process realities of every

portion by calculative the mass of every portion from its measured volume and matching it against existing biological process fact tables.

Color and texture square measure elementary characters of natural pictures, and play a very important role in seeing. Color has been utilized in characteristic objects for several years. Texture is one in all the foremost active topics in machine intelligence and pattern analysis since the Nineteen Fifties that tries to discriminate completely different patterns of pictures by extracting the dependency of intensity between pixels and their neighboring pixels, or by getting the variance of intensity across pixels. Recently, completely different options of color and texture square measure combined along so as to live food nutrition a lot of accurately.

Our system is presently solely the sole one that not only explains and discusses uncertainties in image-based food calorie within the system, the subsequent parameters could have effects on the results: illumination, point of view, and also the camera itself. Illumination is one in all the necessary parameters that have an effect on the system outcome as a result of illumination directly affects the segmentation rule, that successively affects the remainder of the algorithms. to require this into consideration, we tend to place identical plate in 3 different totally completely different completely different} locations with different illuminations and took footage. This strategy was perennial for all of the photographs in our information. The second effective parameter is that the angle of photography; it's chosen 3 completely different angles that square measure around thirty, 90, and a hundred and fifty degrees from the plate of food for all footage. this suggests that for every plate in three different totally completely different completely different} locations we've additionally gotten 3 a lot of footage from different angles s. Finally, the camera itself can have a control on the leads to terms of its lens, hardware, and computer code.

Higher estimation of the realm of every food portion, which may be improved exploitation a lot of correct segmentation strategies, as delineate in item on top of. turning out with associate degree approach to live the depth of the food a lot of accurately, rather than assumptive that the depth is uniform throughout the food portion's space, that is what we tend to assume currently. All of our simulations square measure performed on white plates with a sleek texture. we want to expand our work to varied plates with completely different shapes, textures and colors also.

An activity technique that estimates the number of calories from a food's image by measurement the amount of the food parts from the image and exploitation biological process facts tables to live the number of calorie and nutrition within the food. As argued, our system is intended to assist dieticians for the treatment of rotund or overweight folks, though traditional folks can even take pleasure in our system by dominant a lot of closely their daily ingestion without fear concerning gluttony and weight gain. It targeted on characteristic food things in a picture by exploitation image process and segmentation, food classification exploitation SVM, food portion volume activity, and calorie activity supported food portion mass and biological process tables. Our results indicated affordable accuracy of our technique in space activity, and afterwards volume and calorie activity. a plain avenue for future work is to hide a lot of food sorts from a range of cuisines round the world. Also, a lot of work is required for supporting mixed or perhaps liquid food, if potential.

Section one introduces IMG2 Calories and also the basic ideas of IMG2 Calories an outline and its objectives. in the meantime, section two discusses concerning the literature system papers connected by IMG2 Calories. Section three discuss concerning system style that involves planned system, the design diagram of IMG2 Calories and describes the four modules of IMG2 Calories. Implementation of the system is given in section four. Experimental analysis followed by screenshots square measure shown in section five

II. LITERATURE SURVEY

2.1. SEGMENTATION AND RECOGNITION OF MULTI–FOOD MEAL IMAGES FOR CARBOHYDRATE COUNTING

As people across the globe are becoming more interested in watching their weight, eating more healthily, and avoid obesity, a system that can measure calories and nutrition in every day meals can be very useful. The global spread of metabolic disorders such as obesity and diabetes has raised strong concerns and an urgent need for dietary intake monitoring and control systems. Conventional mobile applications for dietary advice usually involve a great amount of human interaction while they often introduce significant errors. Recently, the widespread use of smart phones with enhanced capabilities together with the recent advances in image analysis enabled the development of a new generation of automatic dietary assessment systems based on computer vision techniques[21]-[35].

A typical computer vision based, dietary assessment system consists of four basic sub-modules: food segmentation, food recognition, volume estimation and nutritional analysis. In the

current study , Novel methodologies for the automatic segmentation and recognition of multi-food images. The proposed system consists of two distinct modules for segmentation and recognition. Initially the plate is segmented using pyramidal mean-shift filtering and a region growing algorithm. Then each of the resulted segments is described by both color and texture features and classified by a support vector machine into one of six different major food classes. The input of the system is a picture of a served meal on a circular plate whereas the output is a map with specific label codes for the background and the different food classes.

The food segmentation algorithm is based on colour information and consists of five main steps: CIELAB conversion, pyramidal mean-shift filtering, region growing, region merging, and plate detection/background subtraction. In CIELAB conversion the input image is converted to the perceptually uniform CIELAB colour space [36]-[40].

Mean-shift is an iterative algorithm for feature space cluster analysis which has been applied with great success to image segmentation. For the image segmentation problem, we consider as feature space, the joint space-colour hyperspace of five dimensions consisting of the two spatial coordinates (X, Y) and the three colour channels (L, A, B). The algorithm iterates until a certain number of iterations is reached or the shift of the centre point becomes very low. In order to enhance the method's efficiency, a Gaussian pyramid is constructed with four levels, and the algorithm is applied on the smallest scale first. After that, the results are propagated to the larger scale. After filtering, the fine-grain texture is smoothed without losing though the dominant colour edges. Hence, pixels of the same segment ideally have similar colours and distinguishable from the rest of the segments. If the previous assumption is true then a region growing algorithm could grow any seed pixel to the entire area of the corresponding segment [41]-[44].

The region growing algorithm chooses seeds randomly from the pixels which have not been assigned yet to any segments, and expands them to all directions when the colour distance of a neighbouring pixel is less than 0.6**cth (Experimental Estimation Parameter)* from the average segment colour. However, many of the produced segments are too small and assuming there is a minimum size of food item can proceed with a region merging step.

In the next step, locate the plate in the image by using an ellipse detector. An edge map is created, edge components with less than 16 pixels are discarded and then the RANSAC paradigm is applied given the ellipse-generating property of single components. Each segment with more than 10% of its area outside the ellipse is considered background. Furthermore, each of the remaining segments that shares borders with the background for more than 10% of its contour's length is labelled as plate region and it is also discarded.

The recognition module consists of two stages: description and classification. In this study we use colour and texture feature sets for the food description and both sets are histogram-based so they can be easily computed regardless the segment's shape, and normalized based on its size. As for colour features, the histogram of the 1024 most dominant food colours was used. To this end, a hierarchical version of the k-means algorithm is applied to cluster the colour space created by the training set of food images. For texture features the Local Binary Pattern (LBP) operator was used. The LBP operator consists of a 3x3 kernel where the centre pixel is used as a threshold. After combining colour and texture features, a vector of 1280 dimensions is created and fed to a non-linear SVM with a Radial Basis Function (RBF) kernel that will assign to the segment one of six predefined food classes [45].

In order to enhance the method's efficiency, a Gaussian pyramid is constructed with four levels, and the algorithm is applied on the smallest scale first. After that, the results are propagated to the larger scale and the iterations are run again only on pixels with a colour distance more than c-th from at least one neighbour.

The performance of two modules food segmentation and food recognition are evaluated separately. The segmentation dataset consists of 65 images captured with various cameras by the authors and annotated manually [46]-[49]. For training and testing the food recognition
stage more than 5000 food images were gathered from the web and manually annotated. The dataset's annotation allowed the creation of a new dataset of over 13000 image patches belonging to the six major classes of international food: meat, breaded food, rice, pasta, potatoes and vegetables.

The results prove the effectiveness of the proposed method in recognizing food types with relatively distinct colour and texture like breaded food, vegetables and meat. Our system provides automatic segmentation and recognition of multi-food images towards CHO counting for T1D patients. The experimental results prove the effectiveness of the proposed method achieving a segmentation accuracy of 88.5% and recognition rate equal to 87%.

2.2 ENHANCEMENT AND PRE-PROCESSING OF IMAGES USING FILTERING

The aim of image enhancement is to improve the interpretability or perception of information in images for human viewers, or to provide better input for other automated image processing techniques. Image enhancement can be performed both in the spatial domain as well as in time domain. An image may be defined as a two-dimensional function, f (x, y), where x and y are spatial coordinates, and the amplitude off at any pair of coordinates (x, y) is called the intensity or gray level of the image at the point. When x, y, and the amplitude values of f are all finite, discrete quantities, that call the image a digital image.

Digital image processing is the use of computer algorithms to perform image processing on digital images. One of the main application areas in Digital Image Processing methods is to improve the pictorial information for human interpretation. Most of the digital images contain noise. Images are blurred due to noise and henceforth images are needed to be enhanced for further processing. Filtering is one of the enhancement techniques which is used to remove unwanted information (noise) from the image. It is also used for image sharpening and smoothening. To demonstrate the filtering techniques by performing different operation.

There are two types of enhancement techniques called spatial domain and Frequency domain techniques. Spatial filtering is referred to as filtering operations that are performed directly on the pixels of an image. The process of spatial filtering consists simply of moving the filter mask from point to point in an image. At each point (x, y), the response of the filter at that point is calculated using a predefined relationship. Filtering in frequency domain is same as that in the time domain. And is expressed as f(x) where x is a time variable.

There are three types of filters low-pass filters, high-pass filters and high boost filter. A low pass filter is the basis for most smoothing methods. An image is smoothed by decreasing the disparity between pixel values by averaging nearby pixels Using a low pass filter tends to retain the low frequency information within an image while reducing the high frequency information. The low-pass filtered image looks a lot blurrier. But here we are using blurrier image. The images can be noisy even if the camera is good. The statistical nature of light contributes to noise in image. Noise always changes rapidly from pixel to pixel because each pixel generates its own independent noise. The low-pass filter affects the noise more than it does the image. By suppressing the noise, gradual changes can be seen that were invisible before. Therefore, a low-pass filter can sometimes be used to bring out faint details that were smothered by noise.

A high pass filter is the basis for most sharpening methods. An image is sharpened when contrast is enhanced between adjoining areas with little variation in brightness or darkness.

A high-boost filter is also known as a high-frequency emphasis filter. A high-boost filter is used to retain some of the low-frequency components to aid in the interpretation of an image. In high-boost filtering input image h (m, n) is multiplied by an amplification factor A before subtracting the low-pass image.

High boost = A x h (p, q) – low pass Adding and subtracting 1 with the gain factor, we get High boost = (A - 1) x h (p, q) + h (p, q) - low pass.

The objective of the paper is to smooth and sharp the images by using various Filtering techniques, where Filtering techniques are one of the enhancement techniques in the Digital image processing and thus help the beginners of image processing to introduce to various filtering techniques. we had implemented few spatial domain filters and frequency domain filters to remove various types of noises.

2.3 A FOOD RECOGNITION SYSTEM FOR DIABETIC PATIENTS BASED ON AN OPTIMIZED BAG-OF-FEATURES MODEL

The treatment of Type 1 diabetic (T1D) patients involves exogenous insulin administration on a daily basis. In order to compensate for the effect of meal, a particular dosage of insulin is used.

The estimation of this dosage is a complex and time-consuming task, dependent on many factors, with carbohydrate (CHO) counting being a key element. The clinical methods are less accurate. The increased number of diabetic patients worldwide, together with their proven inability to assess their diet accurately raised the need to develop systems that will support T1D patients

During CHO counting. The increasing processing power of the mobile devices, as well as the recent advances made in computer vision, permitted the introduction of image/video analysis-based applications for diet management. In this, the user acquires an image of the upcoming meal using the camera of his phone. The image is processed—either locally or on the server side—in order to extract a series of features describing its visual properties. From these visual properties CHO can be estimated.

A food recognition application was introduced by Shroff *et al*. for the classification of fast-food images into four classes. For each segmented food item, a vector of color, size, texture, shape, and context-based features is computed and fed to a feed-forward artificial neural network (ANN), resulting in recognition accuracy of the order of 95%, 80%, 90%, and 90% for hamburgers, fries, chicken nuggets, and apple pies, respectively. A set of color and texture features was used by Zhu *et al*. together with a support vector machine (SVM) classifier. Kong and Tan proposed the use of scale in variant feature transform (SIFT) features clustered into visual words and fed to a simple Bayesian probabilistic classifier that matches the food items to a food database containing images of fast-food, homemade food, and fruits.

An image is represented by the histogram of visual words, which are defined as representative image patches of commonly occurring visual patterns. Since a certain food type is usually perceived as an ensemble of different visual elements mixed with specific proportions, but without any typical spatial arrangement, a fact that encourages the use of a BoF approach, instead of any direct image-matching technique. An extensive technical investigation was conducted for the identification and optimization of the best performing components involved in the BoF architecture, as well as the estimation of the corresponding parameters. For the design and evaluation of the prototype system, a visual dataset with nearly 5000 food images was created and organized into 11 classes. A system for the recognition of generic food is proposed based on an optimized BoF model.

The proposed food recognition system consists of two stages: food image description and image classification. During food image description, a set of characteristics representing the visual content of the image is extracted and quantified. This set provides input to the second stage, where a classifier assigns to the image one class out of a predefined set of food classes. The design and development of both stages involves two phases: training and testing. During the training phase, the system learns from the acquired knowledge, while during the testing phase the system recognizes food types from new, unknown images.

In order to describe the appearance of the different food classes, the BoF model was adopted. BoF consists of four basic steps are:

1) key point extraction,

2) local feature description,

3) learning the visual dictionary, and

4) descriptor quantization which are involved in both training and testing phases.

Key points are selected points on an image that define the centers of local patches where descriptors will be applied. In the current study, three different key point extraction methods were tested: interest point detectors, random sampling, and dense sampling. After the key point extraction, a local image descriptor is applied to a rectangular area around each key point to produce a feature vector. SIFT interest point detectors are used for determining an appropriate descriptor size. A minimum size of 16 × 16 is often used. Color definitely constitutes a valuable source of information for image description. Color histograms are probably the most common color descriptors

For the proposed system, five color histograms were considered covering different combinations of invariants: *HistRGB, HistOp, HistRG*norm, *HistHue, and HistRGB*trans calculated in the RGB color space, the opponent color space, the RG normalized channels, the Hue channel, and the transformed RGB color space respectively.

Once the descriptors of each training image patch have been computed, the most representative patches need to be identified which will constitute the system's visual words. The most common clustering technique used for the creation of visual dictionaries is the *k*-means clustering algorithm. l interpolation routine used in MRI systems. B. Bicubic 1.

This analysis was conducted to compare the effects of super resolution between zero-padding and bicubic interpolation, a commonly used interpolation method outside the MRI field

Descriptor quantization is the procedure of assigning a feature vector to the closest visual word of a predefined visual vocabulary. Once the visual dictionary is learnt, each descriptor of an image is quantized and the histogram of visual word occurrences serves as a global description of the image.

The process of food image classification consists of two phases: training and testing. In order to identify the appropriate classifier for the specific problem, several experiments with three supervised classification methods were conducted: SVM, ANN, and Random Forests (RF).

For the experimental needs of the system developed a dataset of 4868 color images

was created by collecting images from the web. The food types and their categorization were identified in collaboration with the Department for Endocrinology, Diabetology and Clinical Nutrition of Bern University Hospital, Inselspital. A total of eleven (11) classes were considered (the number in the parenthesis denotes the number of images per class): *C*1: Bread (506), *C*2: Breaded food (310), *C*3: Cheese (412), *C*4: Egg products (398), *C*5: Legumes (257), *C*6: Meat (174), *C*7: Pasta (564), *C*8: Pizza (731), *C*9: Potatoes (440), *C*10: Rice (399), and *C*11: Vegetables (677).

In order to evaluate the performance of the food recognition system, the overall recognition accuracy (ORA) was considered, which represents the percentage of the correctly classified test images. All the experiments were carried out within the MATLAB environment on a machine with an Intel Q8300 CPU and 8 GB of RAM. The VLFEAT library was used for the SIFT detector/ descriptor and the *k*-means/*hk*-means clustering techniques.

The first experiment proved the superiority of dense key point extraction which was able to produce the required large number of patches with minimum overlap between them. The second experiment investigated the effect of the descriptor's size on the final performance. The best results were obtained by the combination of descriptors with sizes 16, 24, and 32. By using descriptors with different sizes, the BoF system gained multi resolution properties that increased the final performance, since the food scale may vary among the images.

As regards the learning of the visual dictionary, *k*-means was compared to its hierarchical version *hk*-means. The latter managed to produce almost equivalent results with *k*-means, for the optimal number of visual words, while being extremely computationally efficient. The optimal number of words was determined to be approximately 10000, since fewer words resulted in clearly worse results and more words did not improve the performance. The final, optimized system achieved ORA in the order of 78%, proving the feasibility of a BoF-based system for the food recognition problem.

The optimized system computes dense local features, using the scale-invariant feature transform on the HSV color space, builds a visual dictionary of 10000 visual words by using the hierarchical *k*-means clustering and finally classifies the food images with a linear support vector machine classifier. The system achieved classification accuracy of the order of 78%, thus proving the feasibility of the proposed approach in a very challenging image dataset.

2.4 QUANTITATIVE ASSESSMENT OF SINGLE-IMAGE SUPER-RESOLUTION IN MYOCARDIAL SCAR IMAGING

Single-image super resolution is a process of obtaining a high-resolution image from a set of low-resolution observations by signal processing. While super resolution has been demonstrated to improve image quality in scaled down images in the image domain, its effects on the Fourier-based image acquisition technique, such as MRI, remains unknown. We performed high-resolution ex vivo late gadolinium enhancement (LGE) magnetic

resonance imaging (0.4 × 0.4 × 0.4 mm3) in post infarction swine hearts (n = 24). The swine hearts were divided into the training set (n = 14) and the test set (n = 10), and in all hearts, low-resolution images were simulated from the high-resolution images. In the training set, super resolution dictionaries with pairs of small matching patches of the high- and low-resolution images were created. In the test set, super resolution recovered high-resolution images from low-resolution images using the dictionaries. The same algorithm was also applied to patient LGE (n = 4) to assess its effects.

Late gadolinium enhancement (LGE) MRI can visualize the regions of fibrosis or scar in the heart, mainly from previous myocardial infarction (MI). To improve the spatial resolution of an imaging system, one straightforward approach is to directly acquire a high-resolution image. This solution, however, may not be feasible due to higher noise levels associated with high-resolution image acquisition, longer acquisition time and higher hardware cost such as in high and ultra-high field system. Another approach is to accept the image degradations, and use signal processing to post-process the captured images, to trade off computational cost with the hardware cost. These techniques are referred to as super-resolution reconstruction. super resolution is the process of obtaining a high-resolution image from a set of low-resolution observations, thereby increasing the high-frequency components and removing the degradations.

In the applied an algorithm for single image super resolution to myocardial scar imaging to quantitatively assess its effects. To measure the differences between the original high-resolution image and the interpolated image or the super resolution image, used 4 separate indices: mean absolute error (MAE), root mean square error (RMSE), peak signal-to noise ratio (PSNR) and universal image quality index (UIQI). Single-image super resolution significantly improves the errors of the images both qualitatively and quantitatively. However, the magnitude of improvement by super

resolution compared with interpolation was relatively small in images with Fourier-based scale-up method. These findings provide evidence to support its potential use in myocardial scar imaging, but suggest that the current algorithm of super resolution may be less effective in a Fourier-based scale-up method than an image-based bicubic interpolation.

The original, standard clinical MRI (low-resolution) images were scaled up to the destination size by a factor of 4 using the zero padding and the bicubic 1 methods described above. Bicubic 2 was not used because there was no original high-resolution patient image available from which to create a spatially averaged image. Using the respective dictionaries created using the swine training sets, high-resolution images were reconstructed as described above.

Compared with interpolated images, super resolution significantly improved basic image quality indices ($P < 0.001$). Super resolution using Fourier-based zero padding achieved the best image quality. However, the magnitude of improvement was small in images with zero padding. Super resolution substantially improved the spatial resolution of the patient LGE images by sharpening the edges of the heart and the scar. In conclusion, single image super resolution significantly improves image errors. However, the magnitude of improvement was relatively small in images with Fourier-based zero padding. These findings provide evidence to support its potential use in myocardial scar imaging.

III. SYSTEM DESIGN

3.1 PROPOSED SYSTEM

At the first stage, pictures square measure taken by the user with a mobile device followed by a pre-processing step. Then, at the segmentation step, every image is analysed to extract numerous segments of the food portion. it's identified that while not having an honest image segmentation mechanism, it's uphill to method the image befittingly. that is why we've got collectively used colour and texture segmentation tools. Here it'll show however these steps cause AN correct food separation theme. As argued, system is intended to assist dieticians for the treatment of corpulent or overweight folks, though traditional folks can even enjoy our system by dominant additional closely their daily feeding without fear concerning gula and weight gain.

For each detected food portion, a feature extraction method should be performed. during this step, numerous food options together with size, shape, colour and texture are going to be extracted. The extracted options are going to be sent to the classification step wherever, mistreatment the Support Vector Machine (SVM) theme, the food portion are going to be known. Finally, by estimating the world of the food portion and mistreatment some nutritionary tables, the calorie price of the food is going to be extracted.

to enhance the abstraction resolution of associate imaging system, one simple approach is to directly acquire a high-resolution image. This resolution, however, might not be possible because of higher noise levels related to high-resolution image acquisition, longer acquisition time and better hardware price like in high and ultra-high field system.

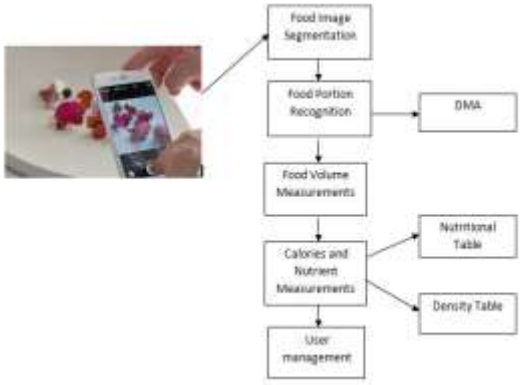


Figure 3.1: Overall system design

The user captures 2 pictures of the food: one from on top of and one from the aspect; the side photo is required to live depth, so as to possess an additional correct volume mensuration. The system uses image segmentation on the picture taken from the highest and uses contours to isolate numerous food parts. The careful style, implementation, and analysis of this image process and segmentation part were represented.

Food Name	*Measure*	*Weight (grams)*	*Energy*
Apple with skin	1	140	80
Potato, boil, no skin	1	135	116
Orange	1	110	62
tomatoes, raw	1	123	30
Bread white, commercial	1	100	17
Cake	1	100	250
Egg	1	150	17
Cucumber	1	100	30
Banana	1	100	105
Orange	1	110	62

Table 3.1: Sample of a Typical Nutritional table

A measurement method that estimates the number of calories from a food's image by measuring the volume of the food portions from the image and using nutritional facts tables table (3.1) to measure the amount of calorie and nutrition in

the food. As argued, the system 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 worrying about overeating and weight gain.

Food type	Error percentage
Bread	0.63%
Cake	2.30%
Spaghetti	-3.07%
Cookies	0.50%
Omelet	10.5%

Table 3.2: Area measurement table

It targeted on distinctive food things in a picture by victimization image process and segmentation, food classification victimization Deep learning algorithmic rule, food portion volume measure, and calorie measure supported food portion mass and organic process tables. Our results indicated cheap accuracy of our technique in space measure table (3.2), and after volume and calorie measure. a visible avenue for future work is to hide a lot of food sorts from a range of cuisines round the world. Also, a lot of work is required for supporting mixed or maybe liquid food, if doable. These square measures a number of the benefits,

- A system that may live calories and nutrition in daily meals will be terribly helpful.
- during this projected system that may facilitate patients and dietitians to live and manage daily food intake.
- Recently, there has been a rise within the usage of non-public mobile technology like smartphones or tablets, that users carry with them much all the time.
- Via a special standardisation technique, our system uses the intrinsically camera of such mobile devices and records a photograph of the food before and once feeding it to live the consumption of calorie and nutrient elements.
- Our results show that the accuracy of our system is suitable and it'll greatly improve and facilitate current manual calorie measure technique.

3.2 SYSTEM ARCHITECTURE

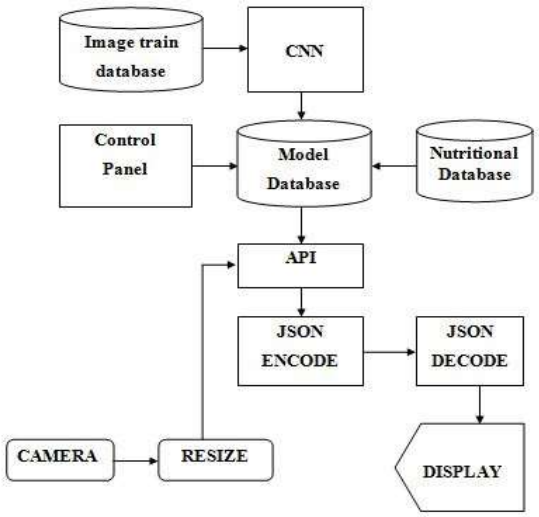


Figure 3.2 overflow of system architecture

3.3 MODULE DISCRIPTION

Img2 Calories consists of four modules, as shown below:

- Capture module
- Gallery module
- Crop module
- View module

3.2.1 CAPTURE MODULE

Img2 Calories is employed to live the nutrition and calorie from food image. System helps patients and dietitians to live and manage daily food intake. System is made on food image process and uses nutritionary truth tables. so as to live the nutrition and calorie, the actual food image is captured employing a Smartphone or the other mobile device equipped with a camera. when capturing the image, image process and segmentation square measure done to spot food parts (i.e., analytic parts like chicken, rice, vegetables, etc., from the general food image), measures the quantity of every food portion, and calculates nutritionary truths of every portion by hard the mass of every portion from its measured volume and matching it against existing nutritionary fact tables.

3.2.2 GALLERY MODULE

Nutrition and calorie measurements are not only done by capturing the image but also by selecting the image from gallery. The image is captured by mobile device equipped with camera, and it is saved into gallery. This facilitates users to find out the nutrition and calorie values whenever they needed it.

3.2.3 CROP MODULE

In this module, the image selected from the gallery or captured image is cropped. It is done in order to get only the required portions of the food. i.e., the unwanted portions can be eliminated. Because the calculation doesn't require the background segments. For example: if the food is taken in a plate, the portion of the plate will be eliminated i.e., we are considering only the food portion.

3.2.4 VIEW MODULE

In this module it can view the entire result of the process occurred. This module allows the user or the dietician to use the measurement results and manage the user's eating habits or clinical program.

3.2.4.1 Result

The result is displayed in the form of list of values. It focused on identifying food items in an image by using image processing and segmentation, food classification using SVM, food portion volume measurement, and calorie measurement based on food portion mass and nutritional tables. Our results indicated reasonable accuracy of our method in area measurement, and subsequently volume and calorie measurement.

IV. SYSTEM IMPLIMENTATION

As folks across the world have become a lot of fascinated by looking at their weight, uptake a lot of healthily, and avoid avoirdupois, a system which will live calories and nutrition in a day meal will be terribly helpful. during this paper, A food calorie and nutrition measure system which will facilitate patients and dietitians to live and manage daily food intake. Our system is constructed on food image process and uses organic process truth tables. Recently, there has been a rise within the usage of non-public mobile technology like Smartphone's or tablets, that users carry with them much all the time.

This project referred to as Img2 calories app can count the calories of foods from the photos on peoples Instagram feed the app that uses advanced image recognition technology could even tell you the organic process price of food. it'll ready to determine any foods that individuals capture in photos and associate a calorie quantity to every item, victimization visual analysis and pattern recognition. Im2 calories uses "sophisticated deep learning algorithms to calculate the right information for calories and apply it to photos. Keep track of calorie intake will be hard and long process-so a lot of so only a few people stick with diligently. the most effective half is that it will work with Instagram-quality photos don't would like a high-resolution DSLR camera to induce this to figure. Such associate app may go an extended means in serving to folks develop healthy uptake habits. Img2 calories would be profit calorie-counting shoppers WHO area unit involved concerning portion management. Doctors and medical analysers may conjointly mixture information from the calorie app for research.

It conjointly aims at victimization Smartphone's as observation tools as they're wide accessible and simple to use. Our system is presently solely the sole one that not only explains and discusses uncertainties in image-based food calorie measure, however conjointly measures and presents actual uncertainty results victimization food pictures and its application situation. This puts our app properly within the context of Instrumentation and measure analysis, and ends up in a lot of purposeful results for food recognition systems. the most reason behind avoirdupois is that the imbalance between the number of food intake and energy consumed by the people

avoirdupois in adults has become a heavy drawback. Recent studies have shown that weighty folks area unit a lot of seemingly to possess serious health conditions like high blood pressure, heart failure, kind II polygenic disease, high sterol, and respiratory disorders. the most reason behind avoirdupois is that the imbalance between the number of food intake and energy consumed by the people. So, so as to slenderize in a very healthy means, further on maintain a healthy weight for traditional folks, the daily food intake should be measured. An app to live calorie and nutrient intake employing a Smartphone or the other mobile device equipped with a camera and records a photograph of the food before and when uptake it so as to live the consumption of calorie and nutrient elements.

The system uses image process and segmentation to spot food parts, measures the quantity of every food portion, and calculates organic process truths of every portion by calculative the mass of every portion from its measured volume and matching it against existing organic process fact tables. Colour and texture area unit basic characters of natural pictures, and play a crucial role in perception. In our projected system, it conjointly aims at victimization Smartphone's as observation tools as they're wide accessible and simple to use.

IMG two calories contains four modules; Capture module, Gallery module, Crop module, read module. within the capture module so as to live the nutrition and calorie, the actual food image is captured employing a Smartphone or the

other mobile device equipped with a camera. when capturing the image, image process and segmentation area unit done to spot food parts (i.e., analytic parts like chicken, rice, vegetables, etc., from the general food image), measures the quantity of every food portion, and calculates organic process truths of every portion by calculative the mass of every portion from its measured volume and matching it against existing organic process fact tables.

Nutrition and calorie measurements don't seem to be solely done by capturing the image however conjointly by choosing the image from gallery. The image is captured by mobile device equipped with camera, and it's saved into gallery. This facilitates users to search out out the nutrition and calorie values whenever they required it. {this will this may this will} be a lot of helpful for the folks that have an interest in change of state and that we can embody them in our daily food intake: if the food is taken in a very plate, the portion of the plate are going to be eliminated

In the crop module, the image chosen from the gallery or captured image is cropped. it's wiped-out order to induce solely the specified parts of the food. i.e., the unwanted parts will be eliminated. as a result of the calculation doesn't need the background segments. For example: if the food is taken in a very plate, the portion of the plate are going to be eliminated i.e., we have a tendency to area unit considering solely the food portion. within the read module we will read the whole results of the method occurred. This module permits the user or the specialist to use the measure results and manage the user's uptake habits or clinical program.

It provides information about the items that can be prepared using the particular fruit item. That is if we capture the image of a fruit or selecting the image from gallery, the image is processed and the nutrition calorie values are displayed. And also, we get the recipe details of the fruit only in a single shake. I.e., by shaking the phone, the list of items that can be prepared using the particular fruit item will be displayed. This functionality helps to provide more information about a fruit that is unaware of the user. This will be more useful for the people who are interested in cooking and we can include them in our daily food intake. The results show that the accuracy of our system is acceptable and very informative and helpful to the users. Our system is accessible to users whenever they needed it.

V. SYSTEM TESTING AND RESULTS

5.1 TESTING

Img2 calories app will count the calories of foods from the photos. In order to measure the nutrition and calorie, the particular food image is captured using a Smartphone or any other mobile device equipped with a camera. After capturing the image, image processing and segmentation are done to identify food portions, measures the volume of each food portion, and calculates nutritional facts of each portion by calculating the mass of each portion from its measured volume and matching it against existing nutritional fact tables.

Nutrition and calorie measurements are not only done by capturing the image but also by selecting the image from gallery. The image is captured by mobile device equipped with camera, and it is saved into gallery. This facilitates users to find out the nutrition and calorie values whenever they needed it. The image selected from the gallery or captured image is cropped. It is done in order to get only the required portions of the food. i.e., the unwanted portions can be eliminated. Because the calculation doesn't require the background segments.

The results are displayed in the form of list of values. This allows the user or the dietician to use the measurement results and manage the user's eating habits or clinical program. Our system also provides information about the items that can be prepared using the particular fruit item. That is if we capture the image of a fruit or selecting the image from gallery, the image is processed and the nutrition calorie values are displayed. And also, we get the recipe details of the fruit only in a single shake. I.e., by shaking the phone, the list of items that can be prepared using the particular fruit item will be displayed. This functionality helps to provide more information about a fruit that is unaware of the user. This will be more useful for the people who are interested in cooking and we can include them in our daily food intake.

5.2 SCREEN SHOTS

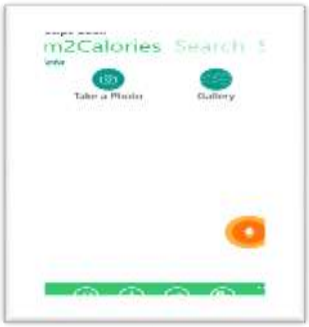
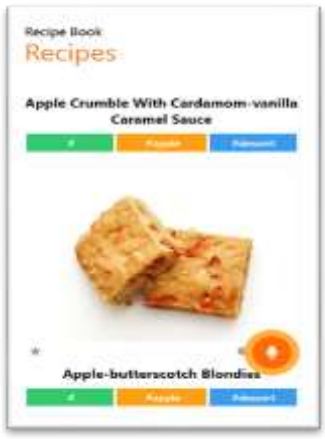


Figure 5.2 (a): Homepages of IMG2 calories

Figure 5.2 (b): Calories and Nutrition view page

Figure 5.2 (c): Recipe page



VI. CONCLUSION

Measurement methodology that estimates the number of calories from a food's image by measurement the degree of the food parts from the image and victimization biological process facts tables to live the quantity of calorie and nutrition within the food. An argued, the system is meant to assist dieticians for the treatment of rotund or overweight folks, though traditional folks can even take pleasure in our system by dominant a lot of closely their daily intake without fear concerning deadly sin and weight gain. It centered on distinctive food things in a picture by victimization image process and segmentation, food classification victimization SVM, food portion volume mensuration, and calorie mensuration supported food portion mass and biological process tables. Our results indicated cheap accuracy of our methodology in space mensuration, and afterwards volume and calorie mensuration.

a noticeable avenue for future work is to hide a lot of food varieties from a spread of cuisines round the world. Also, a lot of work is required for supporting mixed or perhaps liquid food, if attainable.

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