LITERATURE SURVEY ON NUTRITION ANALYZER

ABSTRACT:

One of the most urgent necessities of all individuals is food. Nowadays people mainly focus on diet because of diabetes, and obesity problems. When we have a healthy diet, it leads to a healthy life span. So, this paper gives a solution for this type of common problem. In this paper, we calculate nutritionally and calorie content utilizing image processing, display in the food segmentation and classification process, etc. This is very useful for dieticians despite the reality Ordinary people can benefit from this aswell by manipulating their routine food patterns.

INTRODUCTION:

The concept described in this study is motivated by increasing issues about the health consequences of excess weight. People all over the world seem to be more involved in fat loss, eating healthier, and reducing fatness. A method for calculating calories and nutrients in food items can be very useful. In this report, we suggest a nutrient and calorie calculation method for food that can help individuals and fitnesstrainers in assessing and reporting eating patterns. To lose weight and improve while still eating a healthy diet for typical persons, daily food consumption should be defined. The current paper studies say that obese people are in serious health conditions such as high blood pressure, cardiac arrest, cancer, cholesterol levels, thyroid, respiratory problems, diabetes, etc. The primary reason of overweight is the inequality between the energy consumed by the individuals and the amount of daily food intake [4].
People have started to place a premium on their health and well-being with the aim to maintain themselves safe from injury. Various analyzers have now been set up to help people with their healthproblems by developing various services that help people remain well. A few benefits dependent on calculating nutrition and calories from food photos are discussed in this report. [5].

This method uses segmentation and image processing to recognize food portions, therefore, segregating portions such as fish, gravy, egg, etc. from the entire food image. Calculate the volume of every food part by subtracting the volume of its desired composition and promoted ongoing manual calorie nutritional measurement techniques. The images that have been extracted are put into the SVM. People have alsobeen able to accurately assess pictures with 92 percentage points and product symmetry with 38 percent accuracy [3].

Each property has special features; for obvious reasons, black soil contains iron, which is taken up by plants. As a result, that type of plant will be grown on that plot of property. So, each food contains calories and nutrients. Each nutrient is essential for increasing metabolites. Fat, protein, vitamins, carbohydrates, and minerals are all included in the nutritional value. These

data are considered for all types of human needs. When we absorb an increased quantity of food, we develop problems such as fatness. Malnutrition occurs when we absorb insufficient nutrition, i.e, when it does not meet human necessities. Many people suffer from a variety of issues because of malnutrition. Malnutrition affectsproductivity.

LITERATURE SURVEY:

• C. J. C. Burges, “A tutorial on support vector machines for pattern recognition,” Data Mining Knowl., vol. 2, no. 2, pp. 121–167, 1998.

He stated that the method used is kernel mapping to construct SVM. Training is used for very large datasets is an unsolved problem. Some work has been done on training a multiclass SVM in one step.

• K. Muller, S. Mika, G. Ratsch, K. Tsuda, and B. Scholkopf, "An introduction to kernel-based learning," IEEE Trans. Neural Netw., vol. 12, no. 2, pp. 181–201, Mar. 2001.

He stated about discriminant analysis, and kernel principal component analysis are used as examples for successful kernel-based learning methods. Here full treatment of all available literature was not attempted. Kernel-based learning is indeed highly competitive.

• Yuto Maruyama, Gamhewage C. de Silva, Toshihiko Yamasaki and

KiyoharuAizawa, " Personalization of Food Image Analysis", IEEE

Xplore, November 2010.

He stated on the Bayesian network the results of the analysis will be improved. The accuracy level is upto 92%. Results are easily modified when the analysis contains an error.

• Ms. Ankita A. Podutwar, Prof. Pragati D. Pawar, Prof. Abhijeet V. Shinde, "A Food Recognition System for Calorie Measurement", International Journal of Advanced Research in Computer and CommunicationEngineering, Vol. 6, Issue 1, January 2017.Technique used for segmentation is by Fuzzy C means and classification by SVM. The average accuracy obtained is 89%. Group of images is detected and segmented.

• Ms. Ankita A. Podutwar, Prof. Abhijeet V. Shinde, "Calorie and Nutrition Measurement Based on Food Image Processing", International Journal of Recent Trends in Engineering & Research (IJRTER) Volume 02, Issue 04; April – 2016.Diaware, semi-automatic, mobile

diet data recorder system are proposed in this paper. The result is based on 92.6%. This system was developed to identify the food image is good or rotten.

• ParisaPouladzadeh, ShervinShirmohammadi, and Rana Al-Maghrabi. Measuring Calorie and Nutrition From Food Image. IEEE Transactions on Instrumentation and Measurement, Vol. 63, NO. 8, August 2014.He stated that train accuracy will not be high as expected. Dataset uses 300 images of food.

• S. Jasmine Minija , W.R. Sam Emmanuel. Food image Classification using Sphere Shaped Support Vector Machine. Proceedings of the international conference on inventive Computing and Informatics. (ICICI 2017). He stated that the technique used for feature extraction is local and global extraction and forsegmentation uses SS-SVM. Train the dataset of accuracy 95%. The dataset contains 100 images.

• ManpreetkourBasantsinghSardar, Dr. Sayyad D. Ajij. Fruit Recognition and its Calorie Measurement: An Image Processing Approach. International Journal of Engineering and Computer Science ISSN: 2319- 7242 Volume 5 issue 10 Oct. 2016. He stated that train the dataset of accuracy 94.98%. For training uses125 images and 5 real classes. Uses multi-SVM classifier for a good result. Take approximately 35 seconds to compute the result.

• Patrick McAllister, HuiruZheng, Anne MoorheadSemi-automated system for predicting calories in photographs of meals2015 IEEE International Conference on Engineering, Technology, and Innovation/ International Technology.

He stated that the training dataset has an error of 11.82%. K-means clustering is used for the segmentation of images. Classify the type of food and won't identify the type of food in InternationalManagement Conference (ICE/ITMC)

• AbdulhamidHaidar, Haiwei Dong and NikolaosMavridis. Image-Based Date Fruit Classification IEEE Conference on Ultra Modern Telecommunications and Systems, 2012. He stated that the top accuracies ranged between 89% and 99%. The technique used for feature extraction in computer visionand pattern recognition. Nearest neighbor methods are not accurate.

• Parish pouladzadeh, Gregorio Villalobos, Rana almaghrabi, Shervin shrimp Hammadi, " a novel SVMbased food recognition method for calorie measuring applications " IEEE international conference on multimedia and expo workshops,2012He states that identifying food items in an image by using imageprocessing and segmentation, food classification

using SVM, food portion area measurement, and calorie measurement based on food portion and nutritional tables.

- Geeta Shroff, Asim smallage, "neural networks based food recognition and calorie calculation fordiabetes patients," diawear technical report, pp.1-8, March 2009

It states using a MATLAB and hardware interfacing controller for measuring the mass with a high megapixel camera and precision sensor to take liquid food using SVM, food portion area measurementand the results indicated reasonable accuracy of our method in area measurement.

- Y. Yang, Y. Yue, Z. Wei, J . Robert, W. Jia, and M. Sun ." food volume calculation in different imaging scenarios."In 2011 IEEE 37th annual northeast bioengineering conference (NEBEC). April 2011, pp 1-2. He claims the FRS is an application directly related to the dietary intake assessment applications that take advantage of image processing and pattern recognition to calculate the volume of the food in any selected image and thus estimate the number of calories and nutrient values.

- V Hema Latha reddy, Soumya Kumari, visit Muralidharan, Karan Gigoo and Bhushan S. Thakare, "State of the Art Literature Survey 2018 on Food Recognition and Calorie Measurement", International Conference on Communications and Cyber-Physical Engineering (ICCCE 2019), 2019. They addressed the effectiveness of CNNsfor food image recognition and detection. By building a food image dataset from

images uploaded by a large number of real users through observation of trained convolution kernels, theyconfirmed that color features are essential to food image recognition applied.

EXISTING WORK:

Image segmentation, as shown in Fig. 1, is the method of splitting image data into many divisions indigital image processing and computer vision.

The objective of segmentation is to simplify and/or modify the feature vector into something relevant and ready for analysis. Fuzzy C- Means program is utilized for segmentation. FCM is a type of cluster analysis in which each grid cell can belong to different nodes [7].

- Segmentation is a fundamental phase of the image analysis scheme because it removes the featuresof interest for subsequent processing such as synopsis or acknowledgment.

- Enhancement of graphic data for human opinion.

As per Fig. 2, feature extraction is the aspect of the image compression method, in which a current groupof actual data is partitioned and lowered to more homogeneous clusters. The most prominent factor of these huge datasets is their wide range of things. The appearance of the object is specified methodicallyby computing the local entropy over various fields of the associated component. Size and color-based characteristics are easy to remove and remain the feature extraction activate rapidly, while texture permits to control overrun in color [12].

The ensuing description can then be fed into a variety of analysis and design techniques, which view,categorize, or acknowledge the contextual content of the image or its thing.

Image classification, as per Fig. 3, corresponds to the branding of images into one of a set of conventional groups. A given image can effectively be classified into n different classes. The various contract of landscape elements is identified and separated using bands from a digital object. Integrationand other analytic methods are used to group pixels in conceptual storage with equal intensity values.
The probability dataset is the most used classifier. In most of these cases, SVM generalization efficiency(i.e., "modified on test sets) matches or outperforms existing methods. SVMs have also been investigatedfor intensity estimation [1]. Those who begin by introducing some fundamental principles of theories of learning. The original SVM technique, its execution, and some derivatives are then introduced.

Some consideration will be given to design selection issues, such as how to effectively choose the variables in SVMs. Finally, we explain a few recent and intriguing implementations before concluding [2].The K-means algorithm has several flaws. Since the K-means objective function doesn't seem to be symmetric, it's possible that it holds a variety of global minimums. involves using cloud storage, that necessitates the use of both a client and a server. Only a subset of food characteristics is evaluated.
Large food sections are the priority of pixel analysis [25].

After that, each cluster is allotted to a segment and implemented to the image to produce a data set. Theclassified image that resulted can now be used and viewed as a graph. Fruit acknowledgment is formulated, as well as a calorie estimation with strong emphasis on a laptop device where a camera is mounted. The fruit portion area will be extracted from the fruit image using image segmentation methods, along with other experimental results and texture features [10].

PROPOSED WORK:

Figure 4 explains about the first and foremost step is getting the input image. The input image can be in any type of format. In the next step, the input image will be fed to the segmentation process before that preprocessing will be done so that the next forthcoming steps will be made easier.

The segmentation process is done for segmenting the image i.e., used for the separation of only the food part. The next step is feature extraction which will separate the unwanted part other than food that is not segmented in the segmentation part. In feature extraction, some features will be extracted so that these features will make use of their information. In the classifier part, the images will be trained so that we canbe able to test and train some data. So that we can find the accuracy of the system. The accuracy shouldbe increased for a better system. The next part is recognition used for the identification of food portions. Here nutritional value is fed to the system so that after identification name of the food will be displayed along with the nutritional value.

IMAGE SEGMENTATION:

As per Fig. 5, and 6 states that these are the segmented image of food where we are using FCM for segmentation. First, the original image is given as input, then it is segmented and converted into gray andcolor segmented images. This segmented image is then given for feature extraction.

As per Fig. 7.8, it states that these are the segmented image of Jalebi and Vada food where we are using FCM for segmentation. First, the original image is given as input, then it is segmented and converted into gray and color segmented images. This segmented image is then given for feature extraction.

As per Fig. 9,10,11,12, it states that these are the segmented images of various food items where we areusing FCM for segmentation. First, the original image is given as input, then it is segmented and converted into gray and color segmented images. This segmented image is then given for feature extraction.

Table 1
FCM level of various images

S.No	Segmented images	FCM Level
1.	Fish	0.415686
2.	Jalebi	0.435294
3.	Vada	0.443137
4.	Rice	0.447059

5.	Samosa	0.462745
6.	Egg	0.549021

As per Fig. 14, it states that these segmented FCM value of Egg is very much segmented compared toothers.

The process of separating the image from the original portion of the image is called Segmentation. Segmentation is usually defined as portioning an image into several segments which are used to get clear information about the image. The main purpose of the segmentation is to get a simplified image of something more useful for further processing. The final result of the segmentation involves the collection of segments from the entire image using various methods. There are two types of clustering; they are softclustering and hard clustering. An example of soft clustering is Fuzzy C-means clustering.

B. FEATURE EXTRACTION

As Fig. 15,16 it states that the morphological image after segmentation where it removes imperfections inthe segmented image. Here the small region is removed apart from the segmented food image. By using this we obtained the exact portion of the food.

From the input dataset, the main components would be obtained. Many features like size, shape, texture,and color can be extracted. Here we have extracted a texture feature that is better compared to all other features because it has some unique properties. It can be achieved by more algorithms. Here we are going to do two operations Morphological operations and Feature calculation.

As per Fig. 17,18,19,20,21,22,23,24, it states that the morphological image of various food items aftersegmentation where removes imperfections in the segmented image. Here the small region is removedapart from the segmented food image. By using this we obtained the exact portion of the food. i)Morphological operation

This is used in the separation of unwanted portion removal. This is used to remove the small region orextra region which cannot be or not be removed by using the segmentation process.

- Feature Calculation.

We used the gray level co-occurrence matrix (GLCM) in texture-based extraction. This GLCM is a method for extracting methodological texture characteristics of second order. This GLCM can calculate contrast, correlation, energy, mean, entropy, RMS, variance, smoothness, skewness, and IDM.

Table 2

GLCM Features of Rice,Egg, Vada,
Samosa, and Poori

S.NO	FEATURES	RICE	EGG	VADA	SAMOSA	POORI
1.	Contrast	0.5975	0.4556	1.2370	0.6620	0.3378
2.	Correlation	0.9743	0.9813	0.9411	0.9699	0.9856
3.	Energy	0.5143	0.4924	0.5470	0.5373	0.5136
4.	Entropy	0.9615	0.9975	0.8933	0.9244	0.9694
5.	Homogeneity	0.9893	0.9919	0.9779	0.9882	0.9940
6.	Kurtosis	1.2762	1.0886	2.5483	1.6765	1.2739
7.	Mean	122.5221	91.3799	51.5052	67.4883	72.8724
8.	RMS	154.5455	125.5788	76.5414	93.0326	97.2214
9.	Skewness	-0.3097	0.1665	1.0854	0.7616	0.4668
10.	Smoothness	1.0000	1.0000	1.0000	1.0000	1.0000
11.	Standard Deviation	99.8346	97.7608	80.0513	95.5224	90.4876
12.	Variance	8.5336	6.6071	4.4012	5.0151	5.0640

Table 3
GCLM Features of Jalebi, Idly, Gravy,
Fish, and Dosa

S.NO	FEATURES	JALEBI	IDLY	GRAVY	FISH	DOSA
1.	Contrast	2.1903	0.4579	3.2119	1.5778	0.9826
2.	Correlation	0.9095	0.9810	0.8688	0.9113	0.9596
3.	Energy	0.4636	0.4985	0.4390	0.6060	0.4842
4.	Entropy	0.9906	0.9896	0.9996	0.7903	0.9947
5.	Homogeneity	0.9609	0.9918	0.9426	0.9718	0.9825
6.	Kurtosis	1.3594	1.0851	1.2549	2.8196	1.2765
7.	Mean	63.0358	119.2676	69.3809	33.6765	89.8807
8.	RMS	89.3558	151.3369	93.7989	57.2385	122.2964
9.	Skewness	0.3711	-0.2055	0.2049	1.3079	0.0411
10.	Smoothness	1.0000	1.0000	1.0000	1.0000	1.0000
11.	Standard Deviation	72.2482	106.4083	72.9527	61.0285	85.5221
12.	Variance	4.3651	7.9112	3.9802	3.0583	6.8271

The user can calculate the nutrition and calorie anywhere at any time and no need for waiting and askingthe suggestion. In recent years many Apps for measuring nutrition and calorie measurement have been designed. The accuracy of calculation will also be comparatively low and notifications will not be correctly sent to the user. The mobile application also involves the use of cards. The card helps in the identification of food item that is given as input. The mobile application will not work if the card is misplaced or in the absence of a card. The card plays an important role in such an application.

Table 3

Calories of food items

S.NO	FOOD ITEMS	CALORIES
1	Poori	85
2	Rice	80
3	Vadai	70
4	Samosa	140
5	Veg curry	130
6	Dosa	135
7	Fish fry	55
8	Jalebi	100
9	Idly	40
10	Egg	75

FOOD PORTION RECOGNITION:

Here the food portion is identified by using the food that is trained and tested. The accuracy level is more important because it will help in finding how much the system provides the correct value.

Calculation of Nutritional value

Table 4
Nutritional values 0f Idly, Somosa and Egg

CATEGORY	FOOD ITEMS	CARBO HYDRATES	FAT	PROTEIN	TOTAL CALORIES
PROPOSED WORK	IDLY	32	0	8	40
	SAMOSA	24	18	4	45
	EGG	2	45	24	71

Table 4 Explains the nutritional values of Idly, Somosa, and Egg with its highest accuracy for the dailyintake of food.

CONCLUSION:

The need for a system that automatically measures the nutrition and calorie values of the food we intakethe little essential in modern days. As it saves time, is very user-friendly, automatic, and does not need any manual interruption, etc. So, with the image processing methods like segmentation, extraction, classification using SVM, and finally calories are measured from

the food. This system is very feasible because of its automatic method for many people as it is robust and very comfortable to use. Nutritional levels are also obtained for the food Idly, Samosa, and Egg. The accuracy of our system is very reasonable.