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Nutrition & calories within the food measured using processing & CNN methods

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Abstract

People across everywhere the universe are getting more conscious about their diet. Improper diet can cause many problems like weight gain, obesity, sugar, etc. So different systems were developed to investigate food images to calculate nutrition and calorie level. Within the paper we address the matter of automatic food tray analysis in canteens and restaurants environment, which consists in predicting multiple food placed on a tray image. This technique is incredibly user friendly and easy. It takes the image of food. Then it uses image processing and segmentation methods to calculate nutrition and calories within the food. The system is nutrition measurement technique.

Keywords— *food detection, calorie measurement, image segmentation, convolution neutral network, nutrition.*

I. INTRODUCTION

Healthy eating contains a good impact on the approach to quality life and might prevent diet related diseases like diabetes, obesity and upset. Research data from the Institute for Health Metrics and Evaluation (IHME) in 2015 revealed that dietary risks are leading explanation for disease burden in Australia and contributed to more health loss than smoking, alcohol, and drug use. There are such plenty of great economical costs related to diet-related chronic disease.

Self-monitoring food intake, with the availability of automated and tolerant feedback, is an efficient surgery to make awareness of one's current diet and eating patterns. This is able to require a sensible nutrition system. The most advantage of this approach is removing the burden of self – report. Although there are several studies to adopt these sensors to observe food intake. The typical accuracy for nutrition intake using these sensors is about 90% in laboratory environment. There are two main approaches for estimating the nutritional values from food images. One is to estimate the category of food and output information related to the category. Second is to estimate the nutritional value directly from image features using multivariate analysis. Most conventional methods follows the primary approach. On the first approach, a database is performed on the food name, and knowledge is presented associated with the food. So as to manage many sorts of food, the food names in database should be finely classified. Some data base of internet applications cover all the menus from large food chains.

We consider young adults as they're at a heightened risk of harmful effects of unhealthy ‑meals out‖, because they spend, proportionately, even more on the ‑Meals out and fast food‖ category than the other age bracket.

We are using the second method to estimate the nutritional value from the food image. During this paper we present an algorithm that estimates the nutritional value through semantic segmentation. The algorithm uses the food image recognition. It also uses the user preferences and environmental context information for the greater effect. The user must take the image of food images, this technique will classify

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the image to detect the type of food and portion size and therefore the recognition information will estimate the number of calories within the food.

II. LITERATURE SURVEY

2.1 "*Personalised Classifier For Food Image Recognition*", Shota Horiguchi, Sosuke Amano,makoto Ogawa, kiyoharu Aizawa

Food image recognition tasks are evaluated against fixed datasets. However, during real – world conditions, there are cases in which the amount of samples in each class continues to extend and samples from novel classes appear. In particular, dynamic datasets during which each individual user creates samples and continues the updating process often have content that varies considerably between different users, and therefore the number of samples per person is accomplished on an outsized scale. Personalizing a classifier incrementally for every user ia s promising. during this paper, we address the personalization problem, which involves adapting to the user's domain incrementally employing a very limited number of samples. We propose a straightforward effective personalization framework which could be a combination of the closest class mean classifier. To conduct realistic experiments, we made use of a replacement dataset of daily food images collected by a food – logging application. Experimental results show that our proposed method significantly outperforms existing methods.

2.2. "*Estimating Nutritional Value From Food Images Based On Semantic Segmentation",* Kyoko Sudo, Jun Shimamura, Kazuhiko Murasaki, Yukinobu Taniguchi

Estimating the nutritional value of food supported image recognition is very important to health support services employing mobile services employing mobile devices. The estimation accuracy may be improved by recognizing regions. during this paper, they need propose method that estimates nutritional information supported segmentation and lebeling of food regions of a picture by adopting a semantic segmentation method, within which they need considered recipes as corresponding sets of food images and ingredient labels. Any food object or ingredient in a test food image may be annotated as long because the ingredient is contained during a training food image, whether or not the menu containing the food image appears for the primary time. Experimental results show that better estimation is achieved through multivariate analysis using ingredient labels related to the segmented regions than when using the local feature of pixels because the variable.

2.3. "*Calorie and Nutrition Measurement based On Food Image Processing",* Ms. Ankita A. Podutwar, Prof. Abhijit V. Shinde.

People across the universe have become more sensitive about diet. Unbalanced diet can cause such a large amount of problems like weight gain, obesity, sugar etc. to beat these problems different techniques were developed to be told about food images which can later calculate calorie, nutritional level etc. This paper tells us about different systems which may serves us required leads to terms of calories and nutritional values. This method is extremely useful for patients and dietitians to watch their health. The proposed system can certainly be improved and facilitate this calorie measurement technique.

III. SYSTEM METHODOLOGY

Reviewing the different systems, it is possible to develop another low-cost simple system as to accurately measure the calorie and nutritional level in food. This paper describes a simple and easy hardware implementation of food detection system using raspberry pi, which itself is a minicomputer of a credit card size and of a very low price.

The block diagram of our system is as shown in the figure 1. User need to take the image of the food dish before the meal of the accurate calorie measurement. The next it do the segmentation, each image of food dish before the segmentation, each image will be analyzed to extract various segments of the food image portion. There are color and texture segmentation tools are used for effective measurement. Various features such as size, shape, color and texture will be extracted and send for classification. Thus using above step food is recognized using segmentation.

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Semantic segmentation is a image annotation technique that is mostly applied to scene understanding labels are predicted for each pixels of an image so that the image is divided into object region. Each region consists of pixels associated with the same label. There are many ingredients in recipe database and many ingredients have multiple popular names so segmentation uses co-occurrence of labels not only one image but also between multiple images. We generate classes of food groups this make it possible to partition image into food region and no-food region. We are using support vector machine for classification of food.

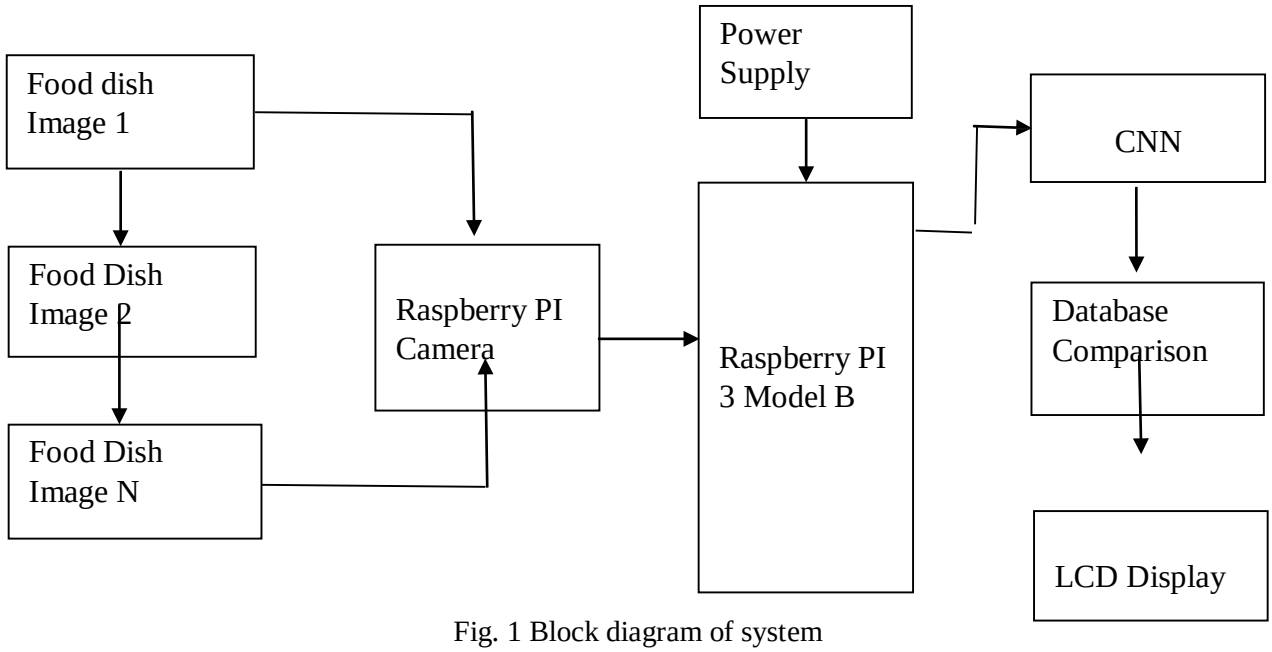

Fig. 1 Block diagram of system

IV. MATERIALS AND METHODS

The main blocks of project are:

1. Raspberry PI
2. PI Camera

With the help of block diagram, we will create pre model of the projet and analyse the function of the project with block diagram over view given as follows:

1. Raspberry PI

Raspberry PI 3 is used for creating robot wireless and web based. Raspberry pi is connected to the smartphone which allows raspberry pi to transmit information over the web network. Raspberry pi uses an SD card for booting and for memory because it doesn't have an inbuilt memory for storage. Raspberry pi requires 5volt supply with minimum of 700-1000 mA current and it's powered through micro USB cable. 5 volt is required for the USB ports. It operates at 1.2GHz (roughly 50% faster than PI2) we use python to writedown the code into the raspberry pi.

2. PI Camera

The raspberry PI has a camera module of 5MP and has a set of focus lens to capture still pictures as well as HD videos. Stills are captured at resolution of 2592 x 1944, while video is supported at 1080p at 30 FPS, 720 at 60 or 90 FPS.

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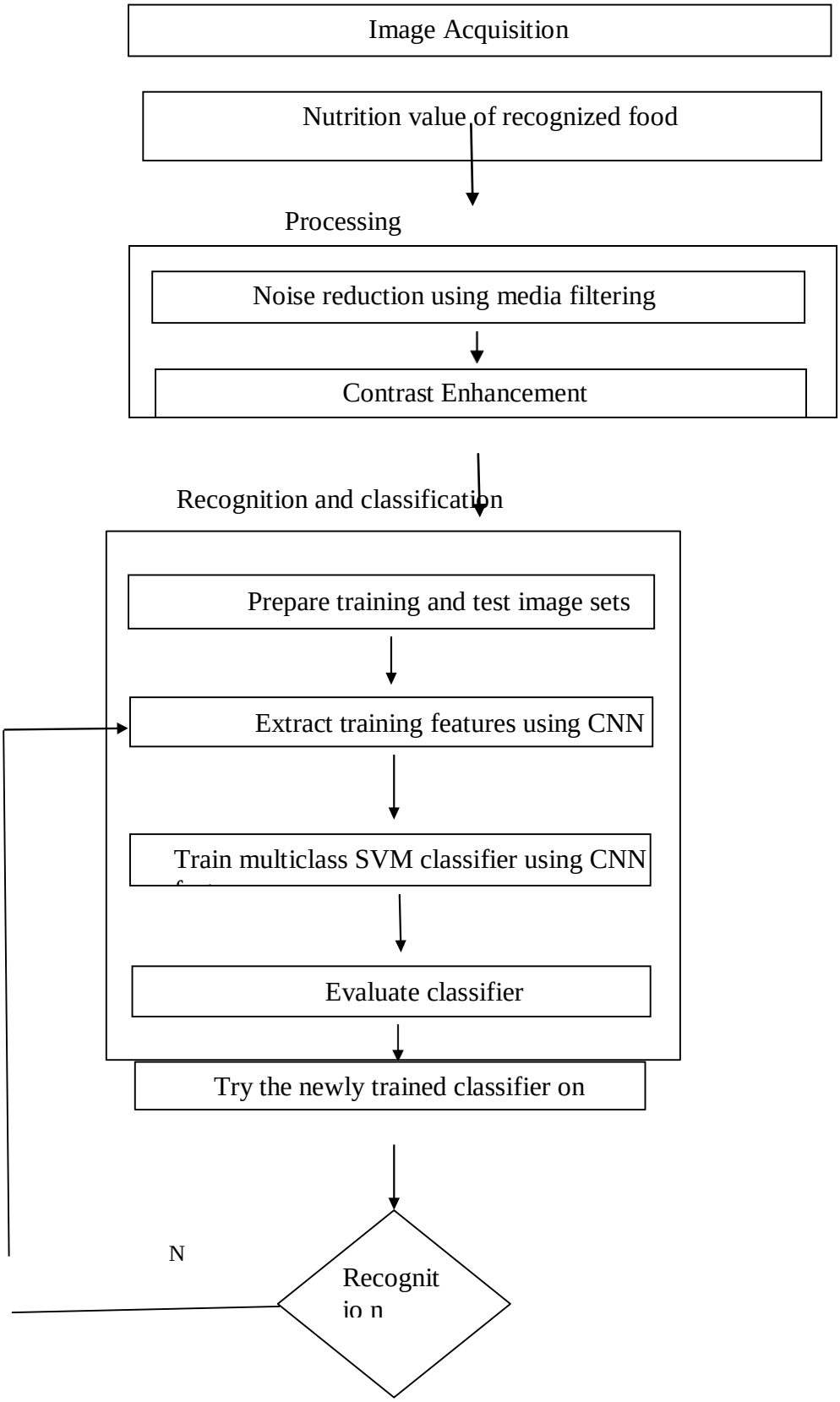

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YES

Fig. 2 Algorithm of system

V. RESULTS

In this experiment, we are using calories, fat, proteins sodium, iron and other nutritional values. We compare the results of SVR nutritional estimation using the label histogram feature as a prediction variable to those of SVR using the colour histogram feature as a prediction variable. The RBF kernel is used for SVR. The number of variables in the colour histogram is 75%. The colour indicates the food label. The results of the images show that foods that are shaped or decorated with fruit or vegetables yield better results when using our method than using simple colour histogram.

Fig. 3 Image of food tray

Table I Required result of System

Nutrition	Average error of colour +SVR	Average error of label +SVR
Calorie	33.6%	31.8%
Fat	38.6%	37.6%
Protein	38.8%	37.9%

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calcium	40.6%	40.2%
Sodium	37.9%	37.7%
Iron	37.2%	38.7%

VI. DISCUSSION AND CHALLENGES

We are proposing an inexpensive solution for classifier personalization. For every food image registration, our SPC calculate similarity between the input and also the vectors within the user's database Vu and also the common database Vm therefore, the amount of similarity calculation is 213+t after the records. This calculation, computation required for an individual isn't large. After two-year operation of our food-logging application. in any case the method within the output it shows the nutrition values of the food.

VII. CONCLUSION AND FUTURE SCOPE

Understanding food habits and portions sizes consumed can form the habits to develop an system to provide context-specific information to guide and improve these habits. This paper presented a totally unique smart nutrition monitoring system for take-away food. It contains an information collection module that contains heterogeneous sensors. Following a fog computing approach, data from such sensors are collected and pre-processed before being sent to the smart nutrition monitoring engine within the cloud for further processing, storage and visualization. In contrast to previous approaches for food intake monitoring, this method is practical and non-invasive with minimum participant's burden. As future work, we aim to develop new modules within the architecture to facilitate the addition of latest sensors to the system with minimum burden for developers and administrators. We also aim to develop advanced analytics capabilities that will catch au fait inaccuracy of individual sensors, increasing even further the accuracy of the knowledge provided by the system.

REFERENCES

1. Bazzano, L.A., He, J., Ogden, L.G., Loria, C.M., Vupputuri, S., Myers, L., Whelton, P.K.: Fruit and vegetable intake and risk of cardiovascular disease in us adults: the first national health and nutrition examination survey epidemiologic follow-up study. The American journal of clinical nutrition 76(1) (2002) 93–99
2. Volkow, N.D., Wang, G.J., Baler, R.D.: Reward, dopamine and the control of food intake: implications for obesity. Trends in cognitive sciences 15(1) (2011) 37–46
3. Basiotis, P.P., Welsh, S.O., Cronin, F.J., Kelsay, J.L., Mertz, W., et al.: Number of days of food intake records required to estimate individual and group nutrient intakes with defined confidence. J nutr 117(9) (1987) 1638–1641
4. Darby, A., Strum, M.W., Holmes, E., Gatwood, J.A review of nutritional tracking mobile applications for diabetes patient use. Diabetes technology & therapeutics 18(3) (2016) 200–212
5. Fontana, J.M., Sazonov, E.: Detection and characterization of food intake by wearable sensors. Wearable Sensors (2014) 591–616
6. Passler, S., Fischer, W.J.: Food intake monitoring: Automated chew event detection in chewing sounds.
   IEEE journal of biomedical and health informatics 18(1) (2014) 278–289
7. Vu, T., Lin, F., Alshurafa, N., Xu, W.: Wearable food intake monitoring technologies: A comprehensive review. Computers 6(1) (2017)
8. Russakovsky, j. Deng. H. Su. J. Krause, S. Satheesh, S. Ma. Z. Huang, A. Khosla, M. Bernstein, A.C. Berg, and L, Fei-Fei, ―ImageNet large scale visual recognition challenge‖, IJCV, vol. 115, no. 3, pp. 211- 252, 2015.

ISSN: 2233-7857 IJFGCN

9. Y. Eskin and A. Mihailidis, An Intelligent nutritional assessment system. In Proc. AAAI Fall Symposium2012
10. R .Surya, S. Saru Priya, ―Food Recognition Using Svm Clssifier for Measuring Calorie and Nutrition Values‖, International Journal of scientific & Engineering Research ,pp. 324-328,2015.

ISSN: 2233-7857 IJFGCN