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Nutrition Facts Recognition from Food Labels Images

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Abstract:- In this project we create a diet log application for the consumers based on the their calories intake from different food items. This way the consumer can maintain a regulatory diet and manage accordingly about his/her calories consumption for a day based on the limit set by the consumer itself. This project is implemented in different phases. The first phase includes the image pre-processing which includes median filtering, adaptive thresholding, histogram equalization and segmentation. The second phase includes the optical character recognition on the segmented data. Finally the total calories intake from each food items is added and an alert message is generated to notify the consumer if exceeded day's limit.

Keywords- OCR, Canny Edge

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I. INTRODUCTION

The development of mobile high-quality cameras and application has created a great opportunity for image processing to impact personal health care. In this project, we implemented a method that creates a diet log of the consumer based on the calories intake from different food items consumed in a day. The data then can be used by the consumer to regulate own diet for a day. The user calories intake can be based on package products such as milk, cheese, chips etc. The other way is by consuming freshly prepared food such as Rotis, Dosas, and fruits like cucumber, apple, and mango etc. First of all, we tabulate all the products to be consumed by the user followed by the calories for non- package foods. Then we take the amount of calories from different package foods. All the calories information is stored in the database of the user. To implement this project we follow different phases. The first phase is the image pre-processing. The package food images are pre-processed which includes the noise reduction and segmentation of region of interest. Similarly the databases of the non-package food products are pre-processed. The second phase includes the reading of the calorie information of each food items from the databases. This process is done by using a method called Optical Character Recognition (OCR)[1].

The processes are shown as follow in a fig 1.

II. IMAGE PRE-PROCESSING

The aim of image processing is to segment data from the images in the databases.

Firstly the image was pre-processed and binarized to remove noise before region filtering. We applied median filtering neighbourhood to smooth out high-frequency noise. We then applied adaptive histogram equalization thus boosting shadowed regions and reducing intensity of bright areas resulting from glare in the original image. Images were then binarized with locally adaptive thresholding. If the maximum intensity variation within a block was below 30, then all pixels were set equal to zero. The whole process is shown in the Fig 2.

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III. FEATURE EXTRACTION

A feature of a character depicts the morphological and spatial characteristics in the image. Feature extraction is a method of extracting of features of characters from the sample image.

A. Indexing and labelling

This is a process by which distinct characters in an image are indexed and labelled in an image. Thus helps in classification of characters in image and makes feature extraction of characters simple.

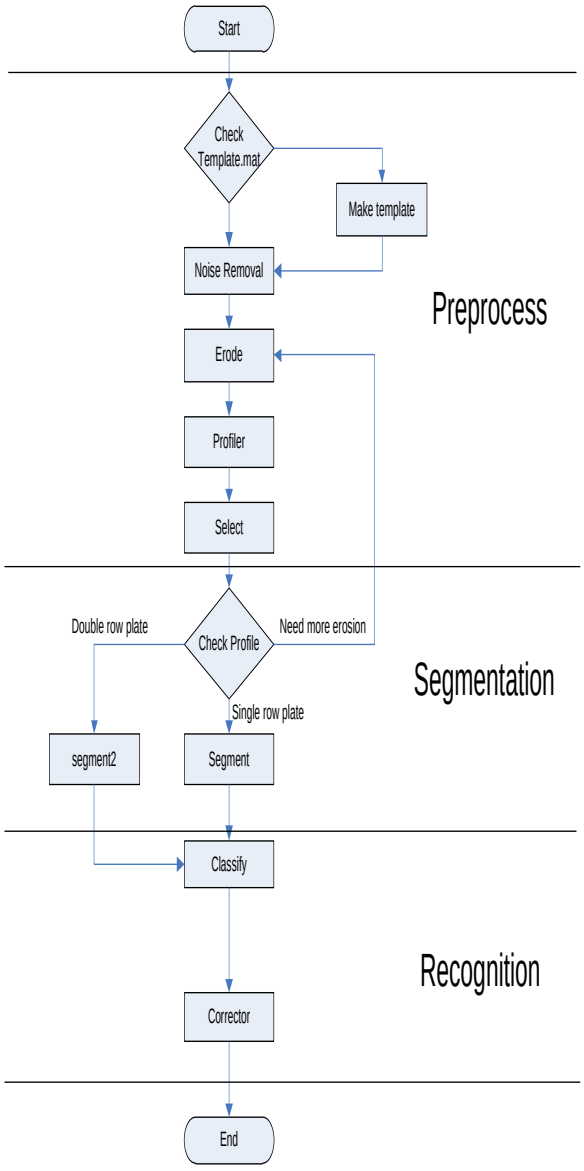

Fig1. It shows the approach followed to implement the project.

B. Boxing and Cropping

This is a process of creating a boundary around the characters identified in an image. This helps by making cropping of characters easier. After boxing the characters are cropped out for storing them as input variables for recognition.

C. Reshaping and Resizing

Reshaping is done to change the dimensions of the acquired character in desired shape.

Resizing is done to reduce the size of characters to a particular minimum level.

Fig 2. From top to bottom :Original image, Median Filtering and adaptive histogram equalisation, Local Adaptive thresholding.

Feature extraction can be done by following steps:-

All the above steps are shown in fig 3.

Differentiation of characters is done by cropping the boxed characters of the pre-processed image. At first the sub-images are are cropped label by label in the sample image, then the character image array is resized to form a 7X5 matrix pixel image. This is done because an image array can only be defined with all images of fixed size.

IV. TEXT EXTRACTION

Text extraction is the process in which the text in the food labels will be extracted and summed to give the net amount of calories consumed. There are several techniques used but here we will be using Canny Edge Detection.

Among the several textual properties in an image, edge-based methods focus on the 'high contrast between the text and the background'. The edges of the text boundary are identified and

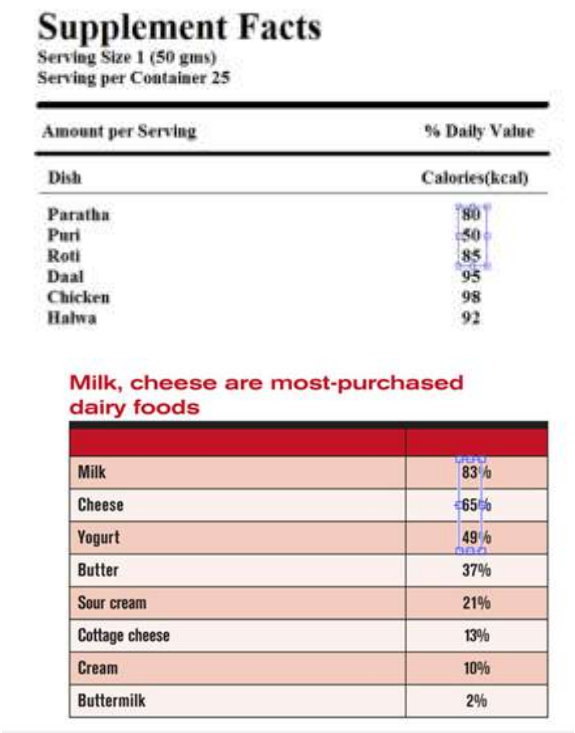

Fig3. Selecting and cropping of images. Top: -Tabular image of non-packed foods. Bottom: - Image of packaged food items.

merged, and then several heuristics are used to filter out the non-text regions. Usually, an edge filters (e.g. canny operator) is used for the edge detection, and a smoothing operation. The Canny Edge uses the local maxima of gradient of I to find edges . The gradient is calculated using the derivative of a Gaussian filter [2]. The method uses two thresholds, to detect strong and weak edges, and includes the weak edges in the output only if they are connected to strong edges for x and y direction as shown in figure 4 (a), (b) [3].This method is therefore less affected by noise, and more by weak edges.

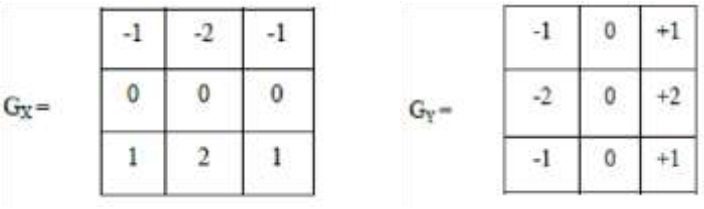

Fig4. Canny Edge detection operator (a) x direction (b) y direction.

The canny edge detection algorithm is easy to implement, and more efficient than other algorithms. From this edge detected images, text is identified [4].

Fig 5 shows the canny edge output.

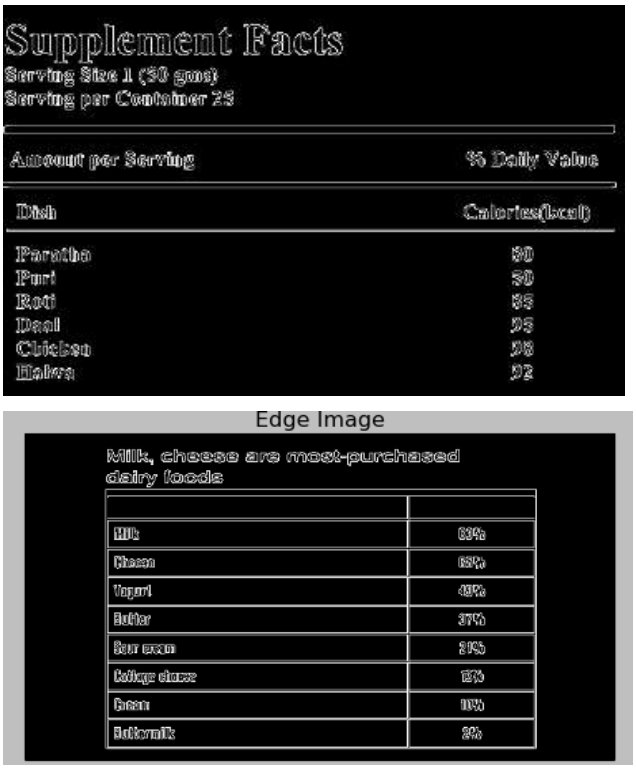

Fig5. Canny edge output of both images.

V. WORD EXTRACTION

In word extraction the alphabets and numeric values are recognised by using a concept of Optical Character Recognition[5]. In this method first of all we create a database of all the characters and numbers in a template form. The characters are matched one- by- one from this template of numbers. If the match is occurred then number is retrieved and extracted. Since the set of words that can appear on a nutrition

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facts label is limited (e.g., calories, cholesterol), we were able to match output to a predefined dictionary to improve our recognition results.

Finally the total number of calories for a meal is given to the user and if the intake exceeds the net amount the alert message is given to the user.

Otherwise if the intake is less than the limit set the net allowable intake left for a meal is printed. These results are shown as follows:

Fig6. Text Extraction

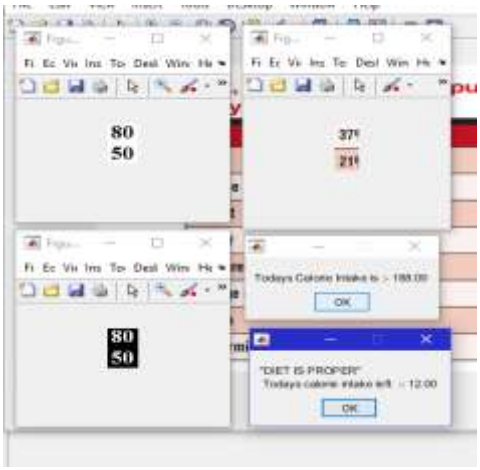

Fig7. Calorie is added and net calorie intake is printed along with intake left.

Fig8. Alert message is generated if set limit is exceeded.

VI. CHALLENGES AND FUTURE WORK

The OCR had difficulty interpreting the smaller words and we didn't train the OCR engine with alphabets and other characters such as '%'. Thus the user will not be able to select the alphabets and other non-numeric characters. Also the main constrained of our program is that the user must select the equal number of rows and columns from both the images. If the rows and columns are unequal then error occurs. Thus our future work may include simplicity in selecting the contents in the table of food items. Also to make a mobile application so that the user is able to modify and select the food items with just touch of hand. And also instead of selecting the calories the user should be able to check the items in the table of food items.

Our further improvements may include saving the calorie database into a file that can be accessed by the user/consumer for reference in future.

VII. CONCLUSION

This report introduced different phases that are being implemented in the project. We presented the method of noise reduction in an image which was achieved by using noise filtering techniques such as median filtering and adaptive thresholding. We then segmented the important data from the image which was the calorie content of corresponding food item. The information of the calorie amount in the food item is recognised by using Optical Character Recognition. The text is detected and then segmented which was then finally added to give the net amount of calorie intake for a day. An alert message was generated if the net intake exceeded the set limit by the consumer otherwise it shows the net consumption left.

VIII. REFERENCES

[1] W. Bieniecki, S. Grabowski, and W. Rosenberg, "Image Preprocessing for Improving OCR Accuracy," in Proceedings of the International Conference on Perspective Technologies in MEMS Design, 2007, pp. 75-80.

[2] Jung C., Q. Liu, and J. Kim, "A Stroke Filter and Its Application to Texst Localization", Pattern Recognition Letters, Vol. 30, pp. 114-122, 2009.

[3] Bharatratna P. Gaikwad, Ramesh R.Manza, Manza R. Ganesh, "Video scene segmentation to separate script", Advance Computing Conference (IACC), 2013 IEEE xplore IEEE, 978-1-4673-4527-9.

[4] Canny, J., "A Computational Approach to Edge Detection", IEEE Trans. Pattern Analysis and Machine Intelligence, 8:679-714, November (1986).

[5] R. Smith, "An Overview of the Tesseract OCR Engine," in Proceedings of the Ninth International Conference on Document Analysis and Recognition, vol. 2, 2007, pp. 629-633.