Image Recognition from Nutrition Labels

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***Abstract*-The project has two main components: image processing and word recognition. This project is to acquire clear images on which to run our word recognition procedure. Though Optical Character Recognition has been extremely successful in reading scanned documents as well as text. There are some issues in identifying text from the images like low quality, unequal lighting etc. The main goal of this project is to obtain and distinguish knowledge regarding nutrition facts from provided photos**

Keywords — Image processing, Image recognition, OCR, Nutrition facts recognition.

I. INTRODUCTION

This project is about recognition of nutrition facts from the food packets. This project will cover most of the image processing techniques and algorithms used for image recognition. Here are some techniques and methods those have been used in this project i.e. sharpening, noise removal, edge extraction, binarization, contrast enhancement, and object segmentation. Now days, these portable devices are used to capture images of different scenes that usually contain text. Sometimes, the text part in the scene images contains useful information that needs to be recognized for various purposes [3]. Like this project by recognizing food facts it will help to the people who has blindness or having problem with vision. Apart from that recognizing food facts it would be easy to differentiate the vitamins, calories, sugar, protein, and other nutrition's part from an image.

In this paper it discusses the specific methods of text detection that have already been used in natural images for text detection. Besides that, the modern age has also been identified new technology.

There will be comparison of some recognition algorithms as part of project and understand their strategies. The simplest method of word recognition may be to run pre-possessed image to identify various line items in the Nutrition Facts table. There will be several images of a nutrition facts label captured on a mobile phone. These images will have various resolutions for testing of this techniques.

For implementation of project there are some techniques & algorithms that will be used in this project:

- Thresholding.
- Median Filtering for noise removal.
- Word segmentation via the Hough transform for line detection, taking advantage of the unique format of nutrition facts labels.
- Edge detection techniques
- Object segmentation
- Otsu's method for binarization.

II. TECHNICAL WORKFLOW

A. Figures and Tables

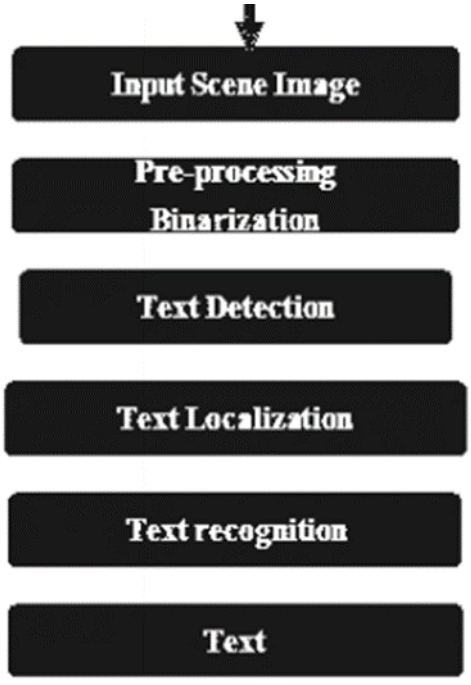


Figure A. Workflow of and steps of system [3]

The image shows the workflow of the project and step by step execution of the program. First, it will read the image from the dataset. Dataset is a collection of data on which the algorithm will be applied. The text detection in any photograph depends on the technique, which makes it more accurate.

In the beginning, we will apply binarization. In simple words, we will convert a colored image into a black and white pixel. After that, the histogram equalization will be
used to reduce the intensity of the image. In the process of binarization, the bright regions are clearly evident, which did not affect the line in the nutrition fact table of food packets. Here the benefit is that the lines are parallel so that we can identify the region and apply the image orientation.

B. Detection (Image and Text)

As mentioned earlier the line are helpful to identify the nutrition part, the original grayscale image will be binarized with the help of Otsu's method.

The next part will be text recognition. In this problem we have used optical character recognition for identifying the text. After applying the Otsu's method, we can get result as shown in figure C. To detect the text part, we have used the Tesseract which is an OCR engine for various operating system which is developed by Google. In the project there are several files for text recognition are used as helping function like analyz_text.m, process_match.m, run_tesseract.m which are by default files for Tesseract files.

Now, after applying the OCR we have text and we already implemented the image detection in previous part. In the result section we will get several output images which contains the different applied filters and processes on it. Some of the results are shown in the figure 2.

The main file of this project is process_nutrition_facts.m which has the main handling part of image and text detection. In this file initially we called all the required libraries and set the path for getting images. There are few lines of code to set the directory for all necessary folder for this project. At the end of the file a analyze_image.m function called which will take some arguments like image name, folder, folder for saving output images etc.

In the file analyze_image.m here we apply the clustering and OCR on the images. Main part of this is clustering. For clustering we used k-means, after applying this default MATLAB function we will get mutually exclusive cluster and index of the cluster. Here with help of 'helping_function' we can get desired output of image from dataset. Here we must note that all resultant image will be saved to output folder.

III. WORKED EXAMPLES

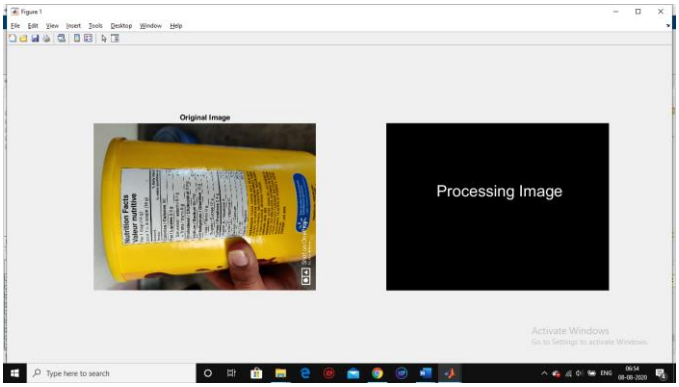
To apply the aforementioned methodology here we used own created dataset. Which contains set of images captured from mobile phone (food packets).

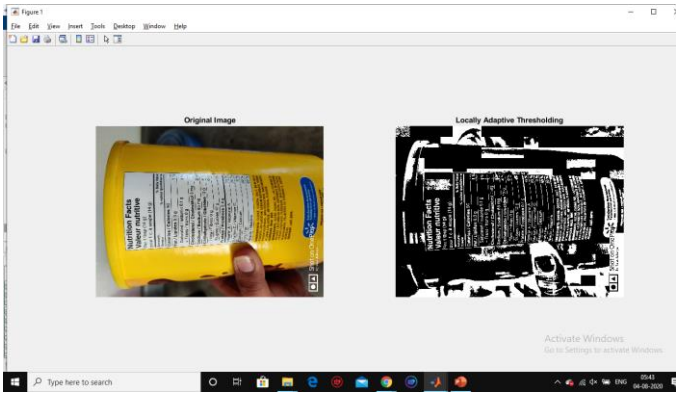
Here below shown in figure B are from the dataset selected for this project.

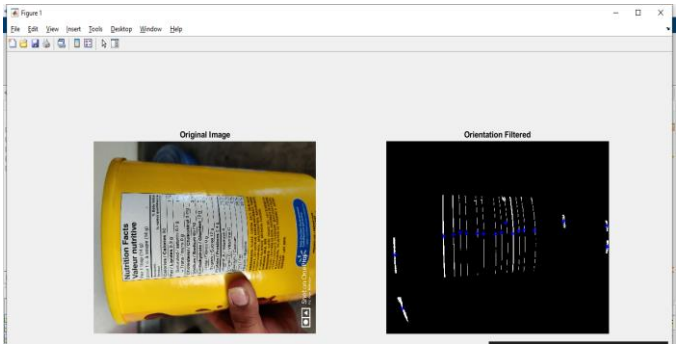
Figure B Dataset Images

Above attached pictures are dataset for current problem In next section we will discuss the output results.

IV. GENERATION OF RESULTS







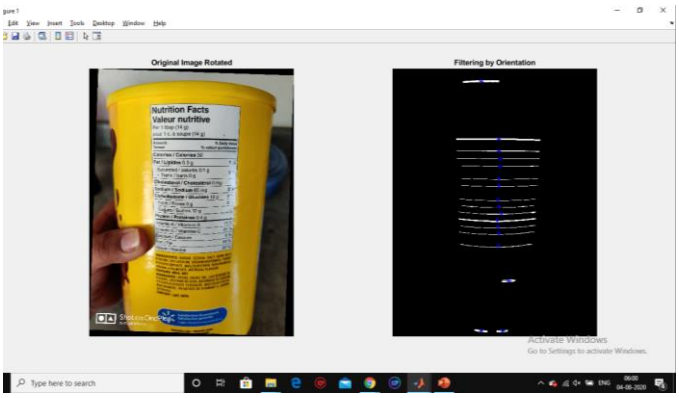


Figure C Final Result Images

Here are results of the following algorithm. In which we can see the results with applying different filters on it. At the end we are getting an image with showing the nutrition and its percentage.

V. Conclusion

Firstly, we have developed this system in MATLAB version R2020a (downloaded with full functionality). After doing this project it can be said the OCR has somewhat difficulty to identify the blur image and cannot read low quality image with no light on it. Another problem was the if we apply this methodology on any random picture then it is not able to detect the nutrition and sometimes it detects wrong information from the picture. Sometimes it happens that we are not able to convert the given image into final nutrition fact image. But we can overcome those failure by using different algorithms and other methodology.

Acknowledgment

I would like to thank Dr. Stephen Czarnuch for wonderful guidance and making this subject more interesting. As well as I would like to thank Ali Ebrahim and Hamed Nasir who are Teaching Assistant for ENGI – 9804, their comments in lab and assignments would help a lot in project work.

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