

Automatically Algorithm for Physician's Handwritten Segmentation on Prescription

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Abstract - Text detection is an important prerequisite for many content-based image analysis tasks. In this paper proposed a novel approach for physician's handwritten text region detection algorithm based on the threshold and the basis of 4 and 8-connected component. The handwriting style of people are privacy. Especially, the physician's handwritten is unique and particular word like medical name, symbolic, symptoms of disease. The prescription form from different health care are different layout then using blank form to delete the recorded form is not enough because that is fix and restrict with form. Our method do not adhered to lay out the form but we used interest of region. The good experimental result shows handwritten text detection and extraction.

Keywords - Intelligent, Algorithm, Handwritten, Text Detection, Prescription

I. INTRODUCTION

Text detection has been a popular area of research since few decades under the purview of image processing and pattern recognition. Text detection is a technique in image processing. The purpose to find out the extent of characters on the image or video [1]. This method uses the basic principles of the edge of the image is more pronounced in order to make the boundaries [2]. The regions of image are obvious difference from the intensity of light from one pixel to another pixel on image and the contiguous. The edges are more pronounced or not it's depending on the

intensity of light during the pixel. Text detection and complete is a challenging issue. In particular, he main reasons are as follows: first the text detection on low quality or the intensity of light is not uniform across the entire image. The less difference between the foreground and the background is a cause. The last there are a lot of lines are a closer proximity between the adjacent pixel resolutions they make the complete text detection are more difficult. For text detection also developing continuously and text detection in natural scene [3] text line detection [4] and extraction in video frames [5], the text detection on document [6-7] with variety techniques. All of these papers used print texts detected which have extracted pattern that is not difficult.

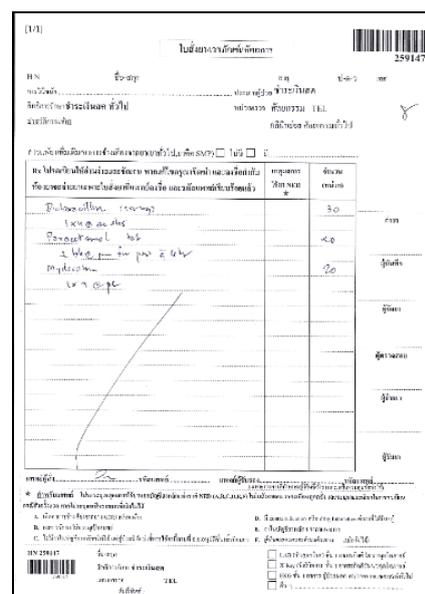


Fig. 1 A Sample of Prescription.

Prescription in agencies that provide health care, such as hospitals and public hospitals and private health, including public health clinics open during special treatment. It found that each prescription that looks placement are different record, see in Fig. 1. Along with the detail in the note such as the diagnosis, the patient's symptoms, drug name, dose, characteristics of drugs, physician's signature these are recorded by physicians who patient owner. All of details on a prescription has the printed text, the symbols and the handwritten text. The challenge of this paper is focus on handwritten [5-6] text detection on prescription form.

The remaining part of this paper is organized as follows. The next section reviews the work done on text detection for various techniques domains. Section third introduces the proposed method. Section fourth the experiment for physician's handwritten text detection on prescription. Section fifth, we demonstrate for discussion in this paper. Then the conclusion and future work are illustrated.

II. RELATED WORK

First review methods for text detection in natural scenes and point out their inadequacies all of image and video. Then we survey the methods generally used for video text detection to show their deficiency in dealing with natural scene text. This leads us to the research gap that we will address by means of our proposed method.

Shi C. et al. [7], use graph model built upon maximally stable extreme regions (MSER) for text detection. The four contributions are detected in the original image, which are shown to be suitable for text detection. Special features effective was designed for MSERs and used to train a classifier to estimate the probability text. The graph model that cost function incorporates region-based as well as context-relevant information. The different information carried by the function optimally balanced to get labeling result by minimizing the cost function via graph algorithm. This method shown encouraging performance,

especially in the precision. The recall still needs improvement because by disturb of the illumination condition.

Yin, Xu-Cheng, et al. [8], design a fast and effective pruning algorithm to extract MSERs as character detection using the strategy of minimizing. The proposed system is evaluated on the ICDAR 2011 regularized variations dataset. The result shown the f-measure is over 76%, much better than the state-of-the-art performance of 71%. Three limitations of this algorithm can't detected well on highly blurred natural scene images. The non-English characters detect poorly. The detection multi-orientation, especially for similar multiple text lines with a seriously skewed distortion.

Fraz, Muhammad et al. [9], proposed propose an end-to-end scene text recognition system using exploited color information for better scene text detection and recognition. The main contribution of this paper is to demonstrate that the color information within the images if efficiently exploited is good enough to identify text regions from the surrounding noise. In the part of text detection this algorithm can detected and recognition in various print text using color-based connected components generation and color clustering. All the detected text regions are analyzed with respect to their adjacent text regions. Two nearby regions possess similarities in color and size, the bounding boxes of these text regions are merged into a single bounding box. They solved this problem with a post-processing where the words are separated from each other on the basis of horizontal distance. The distance between the letters of each word is computed. If the distance between letters is found to be greater than a threshold, then it is an indication for breaking the chain into two words and so on. The threshold for separating the letters is empirically computed using the window sizes.

Wu, Liang, et al. [10], presented technique for detecting and tracking video texts of any orientation by using spatial and temporal information, respectively. They combined potential text candidates regardless of

orientation based on the nearest neighbor criterion. To tackle the problems of multi-font and multi-sized texts, they propose multi-scale integration by a pyramid structure, which helps in extracting full text lines. The result of precision, recall and f measure are well for print text.

Kumar, Punith et al. [11], suggested detect and extract the moving text from the news video using hybrid technology in association of edge detection along with the component connectivity analysis. This algorithm is easy to understand and the results in experiment shown well but they did not test this algorithm with the TV news channel in other characters.

III. PROPOSED METHOD

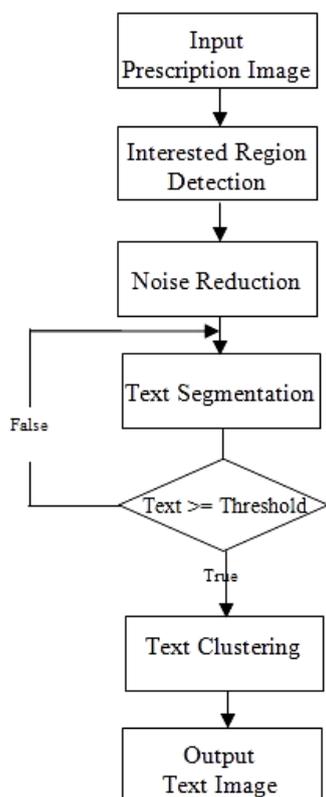


Fig. 2 A Block Diagram of Physician's Handwritten Text Detection.

The handwritten text detection on form has quite impact and influence on lot many image processing applications for extract handwritten text to recording into database like detection and extraction the handwritten text on immigration form, detection and extraction the handwritten text form, etc. The block diagram

of physician's handwritten text detection on prescription shown in Fig. 2. The prescription form has printed and handwritten texts. Moreover Fig. 2, displayed the diagram which can expand the detail follow each block step as:

Step 1: Input Prescription Image

The input prescription image should be standard size 1024x768 pixels and converted to gray scale with (1),

$$f = (0.3 \times R) + (0.59 \times G) + (0.11 \times B) \quad (1)$$

where f is the prescription written form image. R represents red color, G and B represent green and blue color, respectively and convert gray scale to binary with (2),

$$P(x, y) = \begin{cases} 1; & f(x, y) \neq 0 \\ 0; & f(x, y) = 0 \end{cases} \quad (2)$$

where $P(x, y)$ is the coordinates of each pixel in the binary image, $f(x, y)$ is the coordinates of each pixel in the grayscale.

Step 2: Interested Region Detection

The prescription form are different layout then the region of interest on prescription form was set. Our interested area was set to table see in Fig. 3 and 4.

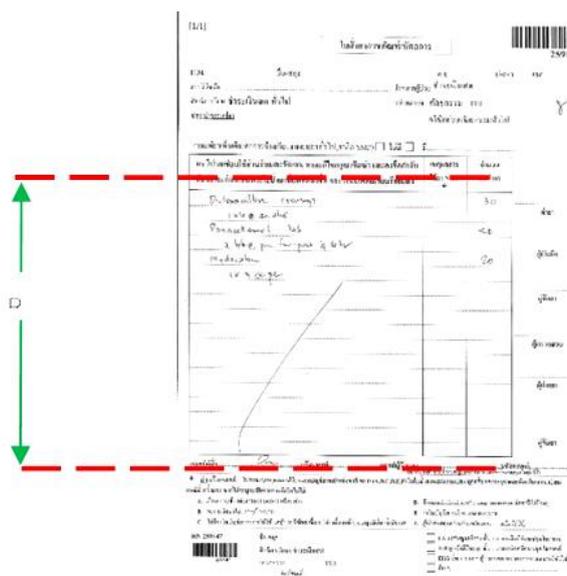


Fig. 3 Region of Interest.

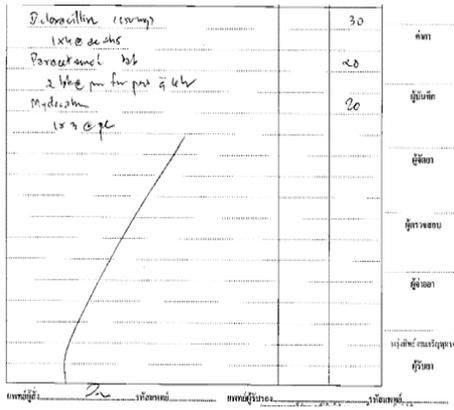


Fig. 4 Sample of Converted Images Gray Scale to Binary Image.

This step set the interest region that is the handwritten text area but it still has noise like grid, lines etc.

Step 3: Noise Reduction

The noise reduction step, we propose reduce noise follow as:

- Removable noise at the edges.
- Eliminate interference with less than threshold.
- Eliminate interference is larger than threshold.
- Removing the noise, the lines and grids.

We set threshold and compute on the binary image. Threshold in our system has two value and the result displayed in Fig. 5.

If $T > 340$ pixels then delete and if $T < 5$ pixel then delete where T is intensity of black pixels.

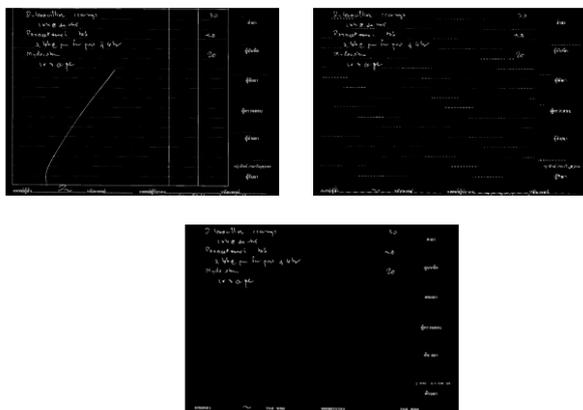


Fig. 5 Reduction Noise

(a) Original, (b) Threshold > 340 , and (c) Threshold < 5 .

In Fig. 5(b) and (c) indicated to remove grid and line which remain the group of text only.

Step 4: Text Segmentation

Our text segmentation method the histogram and connection components are used in this step. Histogram represent the frequency of the pixel area of interest. The horizontal histogram used for splitting line break and the vertical used for splitting character. The splitting decision at the min point which it has minimum or no has black pixel, see in Fig. 6.



Fig. 6 The Example of Text Segmentation.

Then connection component is used to search the pixels are continue connection. If their edges touch that's means that pair of adjoining pixels is part of the same character only if they are both on and are connected along the horizontal or vertical aspect. The connected components in our system there are two methods that are 4 and 8 connection components shown in Fig. 7.

Step 5: Text Clustering

Afterwards, finish splitting line breaks and splitting character with histogram and considered the connection component pixel. We cogitated text clustering for crop handwritten text image. The measurements for the set of properties specified for each connected component in the binary. The contiguous regions are label matrix containing contiguous regions might look like this as Fig. 8.

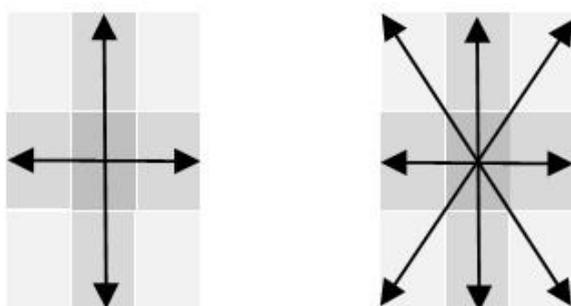


Fig. 7 Connected Components 4 Connected Component and 8 Connected Component.

Elements of L equal to 1 belong to the first continuous region or connected component. The elements of L equal to 2 belong to the second connected component and so on. Discontinuous regions are regions that might contain multiple connected components. A label matrix containing discontinuous regions might look like this: Elements of L equal to 1 belong to the first region, which is discontinuous and contains two connected components. Elements of L equal to 2 belong to the second region, which is a single connected component. Then all text will crop shown in Fig. 9. Finally, the last output text that were crop by our algorithm can isolate to text image. We enlarge the image in each line break to obvious up and display the text extracted in Fig. 8.

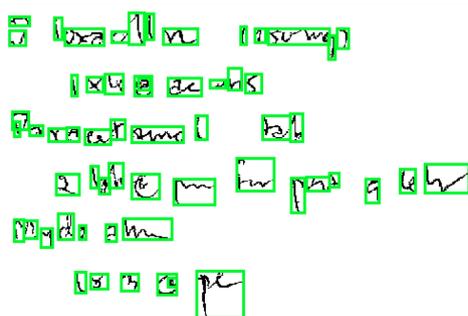


Fig. 8 Handwritten Text Detection.

Fig. 8, shown the example split both of handwritten and print text, the numeral and symbols images that it can detected. This is a problem is our future task.

IV. THE EXPERIMENT AND RESULTS

The proposed technique consists of a major contributions, that is, handwritten text detection. The

dataset in our experiment are the recorded prescription form. The results in text detection and extraction illustrate in Fig. 9. We enlarge the image in each line break to obvious.

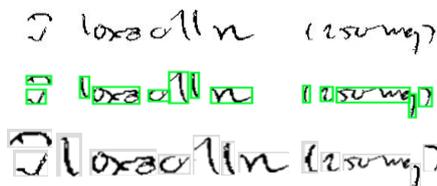


Fig. 9 The Example of Handwritten Text Detection and Extracted.

Furthermore, 131 texts on this prescription are detected. We separated 73 print texts and 58 handwritten texts were detected. The correctly rate for the handwritten text detection and extraction was 42 texts or 87.34%.

V. CONCLUSION

In this paper, we propose a new method for handwritten text detecting. The contribution of this paper is the first algorithm for physician’s handwritten text detection in prescribing on form. This method used the histogram and connected components with challenge physician’s handwritten on prescription. The results displayed the accuracy rate 87.34%. We found many the problems for future work: noise reduction made data lose task, adaptive threshold task, handwritten different style task, the lexicon about medicine, the symbol concerns in prescribing, giving complete end-to-end performance. These are pre-problem that want to improvement for detect handwritten. The recognition is an important technique for handwritten style and it can elongate rate of accuracy.

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