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The Morphological Approach to Determine Medicine's from Drug Store Solution Rack Images

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***Abstract*— In this paper, we show a procedure to perceive medicine from drug store solution rack pictures. The proposed strategy incorporates a few modules, for example, Detection threshold value, medicine rack row discovery and medicine identification and extraction from rack. Firstly, the picture is applied to identify the edges. The proposed method enumerates the number of pixels of each contender for horizontal lines on the edge identified picture and contrasts the worth and a threshold. Chosen lines are amplified which makes some horizontal lines sectioning in the picture into various segments. These individual segments are considered as rack line areas of the rack and each of them is gone into the medicine individual box recognition module for further preparing. Applying vertical line recognition in the way of horizontal line identification strategy on the sectioned areas is not satisfactory to identify a medicine box from rack column as a result of the angular introduction due to medicine box placement. The proposed method recognizes prescription box organized in various rakish angle introduction on a rack and separates between the medicine box and non-box parts in view of a few properties of the box shape. Exploratory results demonstrate that the proposed strategy is fit for extricating rack lines and distinguishing singular box from drug store solution rack picture effectively.**

***Index Terms*—connected component analysis(CCN), Threshold value, Sobel, canny.**

I. INTRODUCTION

Drug store is the science and strategy of get ready and administering drugs. It is a health profession that connections health sciences with compound sciences and expects to guarantee the protected and compelling utilization of pharmaceutical medications. the extent of drug store rehearse incorporates more customary parts, for example, aggravating and apportioning prescriptions, and it likewise incorporates more current services identified to health care, including clinical administrations, reviewing medications for safety and viability, and giving medication data. Drug specialists, in this manner, are the specialists on medication treatment and are the essential health professionals experts who improve utilization of prescription for the advantage of the patients. In drugstores regularly offer medications, and additionally different things, for example, dessert shop, makeup, office supplies, and magazines and sporadically refreshments and basic supplies. pharmacy are place every daily needed drugs can be obtained, With the gigantic development of the quantity of medicines in drug store, some medicine box related exercises where individuals are straightforwardly included, for example, organizing, finding, putting away boxes, and so forth, are turning out to be increasingly depleting and tedious step by step. For this situation, intelligent robot can be an appropriate arrangement where robots can help individuals in drugstore related works. For an illustration, robots can catch a picture of a medicine box arranged in rack and individual box can be removed from that picture to get the positions of individual box on a few racks. In the event that we consider this situation, long haul research in the field of PC vision is expected to execute the box acknowledgment strategy into the wise robot framework. In numerous late works, techniques for box title extraction and acknowledgment is created where recognizing box and extricating them from box are crucial modules. In this paper, we concentrate on identifying box which is an awesome test in such research zone.

Investigating medicine boxes in drug store gives a few components and properties of racks and box. Boxes are separated into a few rack rows and these rows are horizontally rectangular in shape. Medicine Boxes are arranged on rack lines are likewise rectangular fit in shape and they are kept in vertical or horizontal introduction for the most part. Box area identification technique turns out to be more confounded when numerous racks exist inside the picture limit and boxes are oriented in various introductions. In the majority of the cases, boxes are not kept vertically, or the introduction of boxes changes subsequent to expelling one or more boxes from the same column. Fig. 1 indicates case of various racks and course of action of medicine boxes organized in various introductions.

II. RELATED WORKS

A few inquiries similar to medicine box the book recognition strategy have been displayed yet where writers have proposed diverse techniques to concentrate books from bookshelf picture

IN [1] the writers are applied extracting book from bookshelf using edge detection has been done. In [2], [3] and [4] limits of books were considered with a specific end goal to concentrate books. In these works, pictures were caught in an

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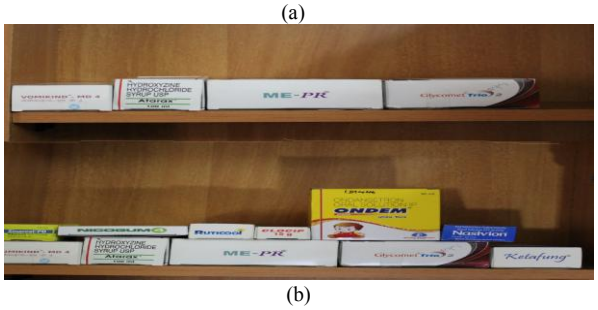
altered way purposefully so that each picture contains single column inside its limit. These methodologies can be unsuccessful if there should arise an occurrence of the pictures containing numerous columns. Book acknowledgment approach in light of book labels was introduced in [5], where book labels were identified first to choose among the contender for book. This methodology is wasteful when labels don't show up on the fancied position on the books or undesirable articles imprinted on books make disarray. In addition, separating amongst tag and non-label item can expand the computational time too. A way to deal with distinguish books was displayed in [6], where high recurrence separating was utilized to recognize singular columns in a whole retire. In that method, high pass Butterworth filter is applied on the image and after the filtering operation, low frequency areas are eliminated and the separated high frequency regions were presumed to cover boundaries of rows. Books division module in [7] is done through a few sub-modules, for example, Line fragment, MSAC (m-estimator test agreement [6]) based figuring of vertical overwhelming vanishing point (DVP) and Segment book competitors. The whole book locale extraction technique in that approach is a significant extensive and confounded procedure. Usage results demonstrate that, utilizing high pass Butterworth channel is not adequate in all the cases and in some cases it neglects to distinguish each line in the rack legitimately. In addition, [8] has displayed a half breed approach that consolidates a content based spine acknowledgment pipeline with a picture highlight based spine acknowledgment pipeline. The content inside the book spine picture is perceived and utilized as watchwords to look a book spine content database. The picture components of the book spine picture are looked through a book spine picture database. The query items of the two methodologies are then painstakingly consolidated to shape the last result [9]. In this methodology, hybridization of a few modules gets to be mistake inclined and muddled and hard to execute. Besides, in all the above proposed approaches, the rakish introduction in book game plans was not considered while identifying books. The above all method describes how to extract books from the bookshelf but in these proposed explains how to extract medicine box from rack.

In this paper, we introduce a technique to recognize boxes proficiently from drug store solution rack pictures. The proposed system can perform acceptably in instances of numerous lines in the medicine box rack and precise introduction of boxes courses of action.

(a)



(b)

(c)

(d)

Figure 1 a) shows image of medicine rack containing single row ,b) shows images containing multiple rows, c) shows horizontal medicine placed in a rack ,d)shows angular introduction of medicine box in image

III. PROPOSED SYSTEM

The proposed methodology includes several tasks. Initially threshold value of captured image is determined. After that, the image is passed through two blocks - box row extraction and box region detection

A. Determination of threshold value

In these method input color image is undergone RGB to GRAY conversion. The converted image is sectioned horizontally to provide two images. The gray converted image is converted from two dimensional to one dimensional. By calculating mean and variance of the image the threshold value of it is determined.

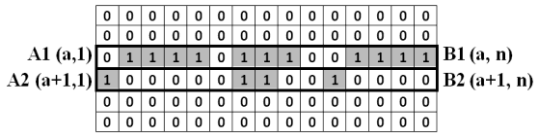
B. Drug store solution rack Row Detection

The medicine box rack line discovery module incorporates some basic steps. As the horizontal line is one of the properties of a medicine box rack, the proposed strategy endeavors to identify the presence of horizontal lines in the picture. For this reason, canny edge detection is performed firstly on the filtered picture and little undesirable pixels are expelled. After that, compared with a threshold value by adding number of pixels of every candidate for horizontal lines.

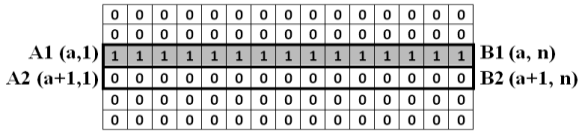
Horizontal line is determined by pixels that reach the threshold are elected as and they are extended up to image boundary. This process creates some horizontal lines on the image which divide the image into different boundaries. These boundaries are considered as rack rows. To describe the line detection operation, let's assume an image having m rows and n columns and assume a horizontal rack line L_H on its edge detected image I_E. . The coordinates of two end-points of that imaginary line are A1(a, 1) and B1(a, n) where $1 \leq a \leq m$. I_E is a binary image where edge pixels are on (intensity value is 1) and other pixels are off (intensity value is 0). Our algorithm now counts the number of on pixels P_H lying exactly under the line L_H and compares the result with a threshold T_L, where T_L is determined as in percent value for the total pixels underlying L_H. This comparison decides whether the current position of LH can be elected as a rack row line. If $P_H \geq T_L$ then all of the candidate's underlying L_H are set to on. Otherwise, all of the candidate's underlying under L_H are set to off. In this manner L_H moves to the next position, where the new coordinates of two endpoints are A2(a+1, 1) and B2(a+1, n). At this stage, pixel for horizontal line at the present location is processed

using the above method. If $P_H \geq T_L$ then all of the pixels of I_E underlying L_H are set to on. Otherwise all of the pixels underlying L_H are set to off. Fig. 2 shows an example of horizontal line determination method.

In the method explained above, to determine horizontal lines of medicine box rows Firstly, the horizontally whole image is needed to be scanned (e.g. top to bottom) where scope of a is 1 to m. After scanning, new image I_X is modified by I_X which contains some pair of horizontal lines that determines the presence of rack rows. As the lines divide I_X into different boundaries, nearby horizontal lines are clustered and combined together to get precise boundaries. Because of this reason morphological dilation operation [9] [10] is applied on I_X. After this process, Connected Component Analysis (CCA) is applied to the input image where extracted isolated regions are separated by determined lines. In this process, rack rows that partially appeared in the image are eliminated as they are apart from our boundaries of interest. For this purpose, length of rack row is determined and rows having comparatively low length are eliminated. The remaining regions are selected as final medicine box rack row regions. After scanning I_X is modified to a new image IR containing some sets of horizontal lines that indicate the presence of medicine box rack rows. Fig.3 shows the results obtain. The input image with arrangement of medicine boxes in row in multiple rows is shown and below figure shows detection rack row lines.



(a)



(b)

Figure 2.Horizontal line detection method for medicine box rack detection. A) every pixel underlying A_1B_1 is made 1 shown in (b), every pixel underlying A_2B_2 is made 0.

(a)

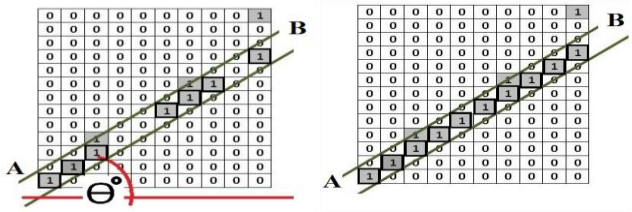
(b)

Figure 3. (a) The input image which has two racks where medicine boxes are arranged , (b) the horizontal line detected image.

C. Box detection

After extracting box rack rows from the image, the extracted rows are passed to the box detection module. Extracted medicine box rack rows contain box spines. The task of this module is to determine boundaries of isolated boxes from the box spines. By setting the horizontal line detection imaginary Vertical line detection can be applied on the image in the same manner as previous method, but in this way, only that are vertically placed boxes will be detected. Vertical placement defines that by considering a box rack row as X axis then a medicine boxes will make 90° with X axis. Problem occurs when a medicine box is not arranged vertically, that defines the angel with X axis is not 90°. In case of the boxes those are not perpendicular to X axis, it is impossible to determine them using vertical line detection technique. Fig. 4 (a) presents the picture of vertical placement t of medicine boxes and non-vertical placement of boxes. The proposed method is capable of detecting medicine boxes placed in any angular orientation (making any angel with X axis). Firstly, the extracted medicine box rack row image I_R from the previous module is filtered with canny edge detection and unwanted small pixels are removed The concept of horizontal line detection is adopted here by setting an imaginary line L_θ on the image which makes an angel θ with X axis (horizontal rack row). Now, L_θ slides vertically (e.g. left to right) above the image and adds the number of pixels P_θ lying under the line L_θ during each step. Every time whenever threshold $T L_\theta$ is reached by a P_θ ($P_\theta \geq T L_\theta$), all of the pixels lying under $L\theta$ are set to on (Where threshold $T L_\theta$ is determined as percentage of the total pixels lying under L_θ). Otherwise, all of the pixels underlying L_θ are set to off. In this method, boxes that make θ angel with a rack row are determined as the pixel for medicine box edges. Once the medicine box rack row image is scanned with $L\theta$, θ is incremented by 1 and a new imaginary line $L_{\theta+1}$ of angel (θ + 1) rescans the I_R in the above way. Similarly, boxes that make (θ + 1) angel with rack row are detected. In the similar manner, medicine boxes making (θ - 1) angel can also be determined by using the imaginary line $L_{\theta-1}$. The idea of the above methodology is represented in Fig.4 (b).. In this procedure, rack row image is processed to detect different angular lines using $L\theta$ where $(90 - x) \leq \theta \leq (90 + x)$. To level optimal running period, x = 30 is considered and the increment of θ is set to 2 for each iteration, rather than 1. After scanning I_R is altered to a new image I_B holds some pair of angular lines which identifies the boundaries of medicine boxes in a solution rack row. The lines divide I_R into several boundaries, but these lines no longer belong to isolated individual boxes. commonly two consecutive medicines have a space between each other which is also detected. To avoid this, morphological closure [10] operation is applied on I_B for clustering the nearest neighboring lines and filling up the space between the boxes.

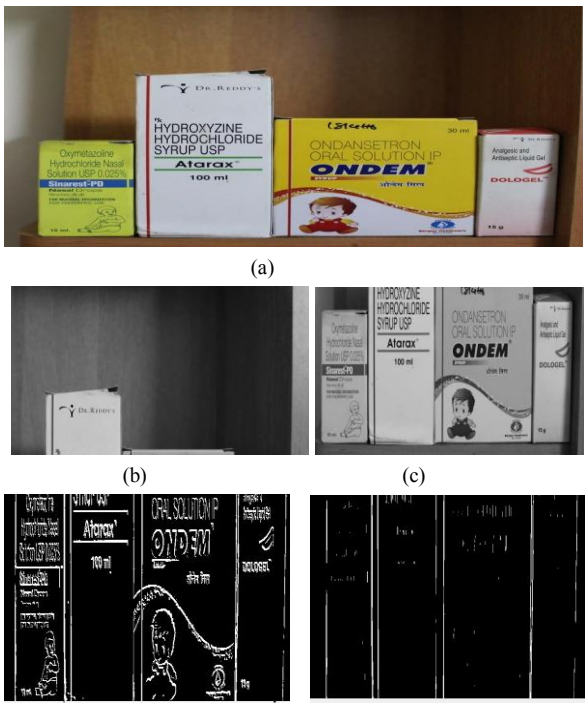
(a)



(b) (c)

Figure 4. (a) image shows angular introduction in medicine box arrangement, (b)angular detection method where pixels underlying in AB is shown (c),every pixel underlying in AB is made 1 is shown.

Isolated areas of individual boxes can be extricated utilizing Connected Component Analysis (CCA). It can be seen from the extricated segments that, a large portion of them are boxes, yet some undesirable articles or segments are additionally separated. For this situation, we can recognize box and non-box parts by dismissing little molded and low tallness segments due to the stature of a box can't be too short or its size can't be too little. The idea of separating amongst box and non-box segments is introduced in Fig. 5. Correlation between the statures of a box and a non-box segment is appeared in Fig. 5 as a case. Where to detect vertical lines sobel edge detection is used.



(a)

(b) (c)

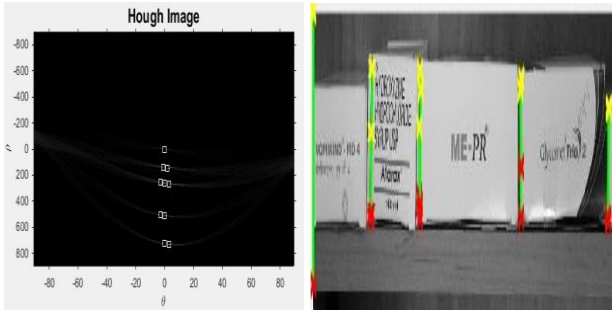
(d) (e)

Figure 5. (a) the medicine boxes placed in rack row image,(b) and (c) shows horizontal section of input image, (d) shows the image of sobel edge detection, (e) shows line detected image.

IV. SIMULATION

The proposed procedure has been actualized utilizing MATLAB programming language. A few pictures have been caught and gathered to utilize them as inputs of the proposed method. Fig. 6-7 indicates simulation results of applying proposed method on various information pictures. From the figures, it can be watched that the proposed technique demonstrates sufficient execution to recognize boxes and concentrate them from drug store solution rack pictures.

(a)



(b) (c)

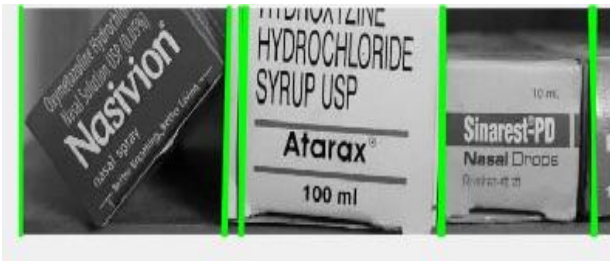
(d)

(e)

(f)

Figure 6. Results of Line detection (a) shows input drugstore solution rack picture,(b) and (c) hough transform function for lines detected and original color image with lines respectively, (d) and (e) shows gray image with line detected and color image with line extended respectively, (f) shows the segmented image with medicine number

(a)



(b)

(c)

Figure 7. Results of angular orientation (a) shows angular introduction in arrangement of medicine boxes, (b) shows line detection from an input image, (c) shows detection of medicine's from the image

V. FUTURE PLAN

In spite of the fact that the title extraction module is past the extent of our paper, the proposed strategy can be incorporated effectively into any title extraction technique and this test will stay as our future arrangement. There are a few constraints of the proposed procedure. Separating amongst box and non-box things depends just on the tallness and size of the parts removed by CCA . Here, numerous different components are should have been considered e.g. shading and width of a box. A superior arrangement can be embracing a classifier which can be prepared to order box and non-box parts. The proposed strategy can be enhanced to distinguish boxes all the more precisely and this is a future arrangement of our exploration.

VI. CONCLUSION

In this paper, a new technique is proposed that detects medicine boxes from drug store solution rack image. Firstly, the proposed method determines medicine box rack rows from the given input image by using a horizontal line determination process. After that, the medicine box rack row image is processed for further detection. Angular line detection method is adopted rather than vertical line determination process because of the angular introduction of medicine box placement. The proposed method recognizes individual boxes and isolates them and recognizing medicine box and non-box parts. Simulation result shows that the proposed method successfully detects medicine boxes from drug store solution rack image.

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