Detection of Broken Pharmaceutical Drugs using Enhanced Feature Extraction Technique

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ABSTRACT

Medication has become more important in everyone's life; people are affected by many diseases. There are certain diseases which cannot be cured without medication. The production of medicine has increased a lot in recent days. During production there may be damages like breakage, cracks present in the tablets or capsules. Consumption of these damaged tablets may cause some problem in skin, eyes and mouth. Most of the tablets are not advisable to be consumed in broken form. Manual inspection is a very challenging task. Image processing plays a major role in automation of visual inspection. Therefore we propose some ideas to identify the damaged tablets after production. This is a series of process involving image enhancement, segmentation, thresholding, filtration, pixel calculation, subtraction, de-noising and region based statistic to identify the broken tablets. In the case of capsules we propose a feature extraction technique to find the defective blister.

Keywords:Tablets,Capsules,Imageprocessing,Defectiveblister

I.INTRODUCTION

Image Processing involves techniques and algorithms for processing the digital images. Image processing provides greater contribution to science and technology as the digital images have a greater impact on modern society. Image processing includes many techniques like pattern recognition, feature extraction, template matching and edge detection to process digital images. They help in faster manipulation of digital images. Manual inspection is automated using image processing techniques. Automation of Visual inspection is very important in manufacturing industry for quality assurance of products. In pharmaceutical industry, drugs have to be inspected for defects and anomalies. Drugs with defects are not advisable to be consumed. There may be side effects in consumption of broken drugs. The foil may contain broken tablets or missing capsules. The inspection process has to be effective to detect the foils with defects. The proposed technique detects the foils with broken tablets and to detect the blister of capsules.

II.RELATED WORKS

In the previous work [1], a morphological operation like 'opening operator' is used to detect the defects. Image segmentation is done and the input image is filtered to remove the noises thereby making the input image fit for further processing. The image is subtracted by inscribing rectangles with morphological operation. Then the image is subtracted from the original gray image which identifies the broken tablets. Pseudo colouring is done and the pixel of the broken tablet is calculated. For capsules [2], corner detection and harris algorithm is used to defect the individual capsule with holes, incorrect size or colours and cracks. The input image undergoes pre-processing. Objects are extracted based on the region based properties. Corners are detected and it is compared with the template image. If the feature points match in the template image and the test image capsule is accepted otherwise rejected.

III. Proposed System Architecture

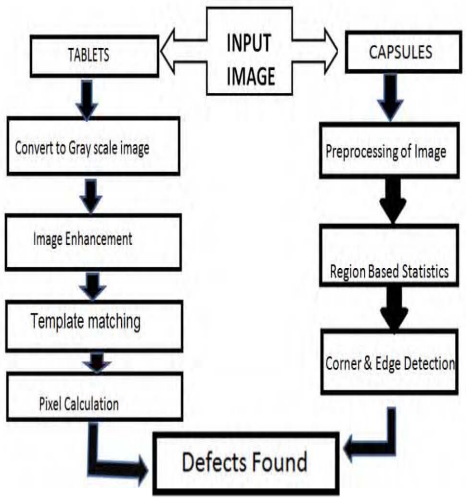

Fig1. Architecture of the Proposed System.

The image is captured and given as input to the system. In the case of tablet, the gray scale image of the input is obtained. Gray Scale image is the conversion of the colour image to monochromatic shades of black to white. The gray scale is enhanced for further processing. Edge detection in digital image marks the regions where the brightness changes sharply. Image enhancement involves removal of noise from the image using thresholding. Conversion of gray scale to binary image is called thresholding[3]. Then the image is filtered using the low pass filter operator called Canny Edge detector. Canny edge detection operator is used to obtain each tablets boundary in a blister [4][5][6]. Since the image is more noised further dilation is done to completely filter the image. A template image is saved in the system. The template image is the image without defects. The template image undergoes all the process similar to the test image. Then the test image is compared to the template image. The pixels are calculated for the template image and the input image. The pixels are compared, if the template image pixel is greater than the input image pixel then the there is a defect in the blister. The user is provided with the output console with the alert message and the number of pixels. For capsules, the input image undergoes the pre-processing steps. Performing segmentation before classification makes the automated inspection feasible and consistent [7]. Image Segmentation [8][9] involves the partitioning of image into different segments. The input image is segmented. Image histogram of the input image is obtained. Image histogram acts as the graphical representation of different colors present in a image. Region based statistic is done to detect the objects in the image based on their properties. Image is segmented into various regions and processing is done to different regions separately. Feature extraction[10][11] is done which marks the region where the capsules are present. This identifies the blister with the missing capsules.

A. Algorithm for Identifying Defects in Tablets:

Step 1: Read the tablet strip as input image.

Step 2: Display the input image.

Step 3: Convert the input image into grayscale image.

Step 4: Display the converted grayscale image (Fig 2).

Step 5: Threshold the grayscale image.

Step 6: Display the threshold image.

Step 7: Filter the image to remove the noises.

Step 8: Display the filtered image.

Step 9: Dilate the filtered image.

Step 10: Display the dilated image.

Step11: The image of the tablet strip without any damage is taken as a template image. The template image undergoes all the pre-processing steps similar to the input image.

Step 12: Display the template image.

Step 13: Compare the input image and the template image.

Step 14: Display the compared images.

Step 15: Calculate the number of pixels damaged by comparison with the template image.

Step 16: Display the number of damaged pixels.

Fig2: Gray scale Image

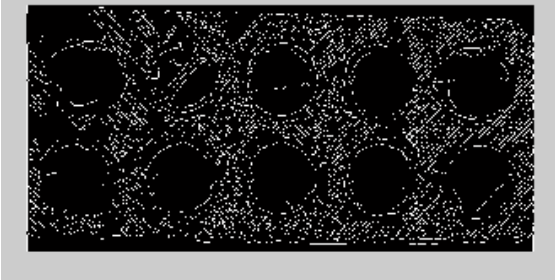

Fig3: Canny Edge Detection

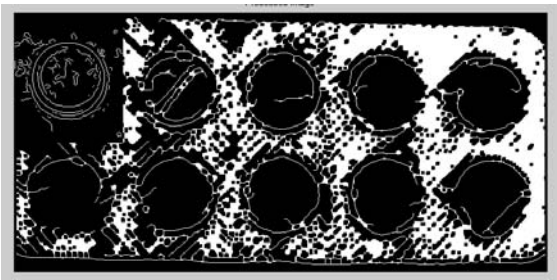

Fig 4: Template matching

B. Algorithm for Capsules:

Step 1: The input image is obtained from the user.

Step 2: Pre-processing of image is done to enhance the image which will be suitable for further processing.

Step 3: Display the enhance image.

Ste 4: Image Segmentation is done to segment the image to identify the number of capsules to be present in the blister.

Step 5: Display the segmented image.

Step 6: Region-Based Statistic method is used to identify the objects in the image based on their region based properties.

Step 7: Enhanced feature extraction technique is used which identifies the pixels where the capsules are present.

Step 8: The missing capsule in a foil is identified using the feature extraction technique and the image is displayed.

Fig 5: Sample Input Image of Capsule

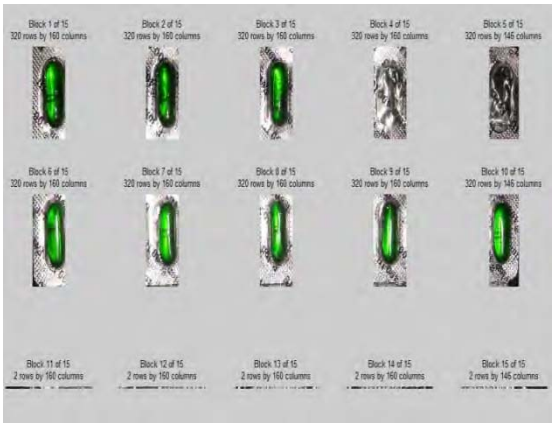

Fig 6: Segmented Image

Fig 7: Feature Extraction

IV. RESULT AND DISCUSSIONS:

The implemented algorithm was experimented with different types of sample of capsules and tablets. One of the tablet sample (Fig 1) undergoes the steps to find whether there is any defect in the blister. In the process, the input image is converted into gray scale image (Fig 2). The industrial and other noises are filtered from the gray scale image which makes the image fit for further processing. Canny edge detection (Fig 3) operator is used for edge detection to filter the tablets from its background. The template image is stored in the system based on the type of input blisters. The template image undergoes all the pre-processing steps similar to the test image. The template image is of single tablet which is compared to each tablet in the blister. If the shape varies then the package is identified as defective tablet. For capsules, the input image for example (Fig 5), which undergoes the pre-processing steps. Segmenting the image is very important to analyse the object based characteristics of the

image. So the image is segmented (Fig 6) and then region based statistic method is used to analyse the image based on the region properties. The image further undergoes the feature extraction method (Fig 7) to identify the missing capsules in a blister. The blister (Fig 8) without defects is effectively identified using the feature extraction method. The algorithm was analysed with different type of samples such as defective and non-defective capsules and tablets. The defective blisters were easily identified and the system has high efficiency.

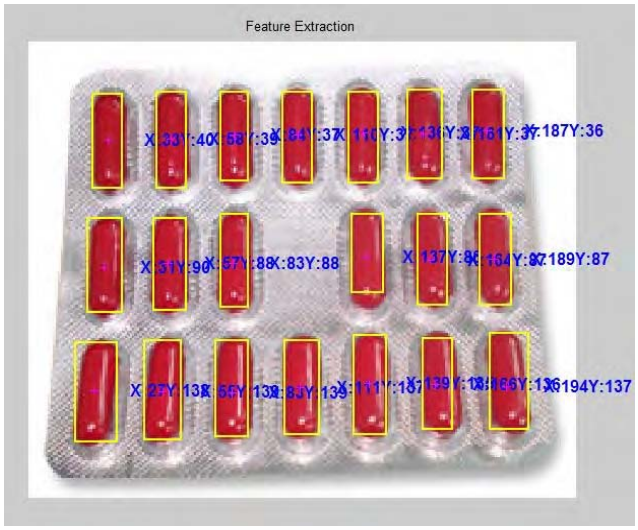

Fig 8: Blister without missing capsule

V.CONCLUSION:

The algorithm proposed in this paper identifies the broken tablets and missing capsules in a blister. This helps in the automation of detection of anomalies using image processing techniques. Image processing involves many techniques to automate the manual inspection process.

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