

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Survey on Prediction of Tablet Positioning and Tracking Using Different Techniques.

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ABSTRACT

A Pharmaceutical drug or simply a Medicine is used to cure, treat or prevent disease thereby it plays a vital role in day-to-day human life. At the time of manufacture, there may be issues like crack or breakage in the tablets and there may be missing of tablets or capsules from the strip or blister. These issues, if not encountered properly may cause serious ill-effects, when consumed. So, they must be checked properly for any kind of damage during the process of manufacture. It becomes a very difficult process, if it is checked manually. So, various techniques are adopted with the help of Image-processing and this paper gives a detailed Survey information about the various techniques to detect the defected tablets.

Keywords: Pharmaceutical drugs, Broken tablets, Missing capsules.

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INTRODUCTION

Image-Processing provide various techniques and Algorithms for processing the digital images in order to acquire some of the useful information which results in an Enhanced image. Processing the digital images literally means to perform certain operations such as converting the original image into a gray-scale image, reducing the noise by applying filters to it, equalizing the Histogram, calculating the pixels, etc.



Fig.1: Inspection of tablets in industries

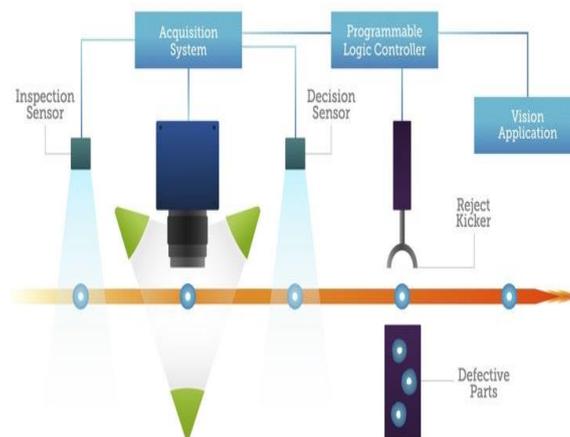


Fig.2: Tablet detecting process

Initially, an image of a tablet strip is fed to the system as input. This input image is then treated with Pre-processing techniques like converting the input image (RGB) into a grayscale image, applying Histogram equalization, etc. Then, either the edges or center of the tablet is detected by using Edge detection method or Center of Mass (COM) method. This image is then compared to the image of the tablet strip without any defect, which is already fed to the system. If both the input image and the original image are matched, then it is taken as a good tablet. If not matched, then it is taken as a defected tablet. Similar process is done for capsules, but instead of detecting the edge, it detects the boundaries of the capsule.

LITERATURE REVIEW

Deepti [1] proposed a paper to detect the defected tablet using Enhanced Feature Extraction technique which is used to detect the broken or missing Pharmaceutical tablet. Detection of defective tablet is based on template matching, i.e., matching of the template image

with the input image. Here, a new technique that detects the pharmaceutical drugs by using Centre of Mass and Color Segmentation is used. In Centre of Mass, the center of each tablet in a strip are found. If the centers are detected, then the tablet is present in the blister. If not, then the tablet is broken or absent. Similarly, in the Color Segmentation Method, Color Detection is applied on the blister of Capsules. There are two images of blisters, one image is a missing capsule and another image is of the blister with all the capsules present in it. By matching the pixels of these two images, we concluded that there is a missing capsule or not. That is, if the pixel values are same, then there is no missing capsule broken. The number of good tablets and the defected tablets are calculated.

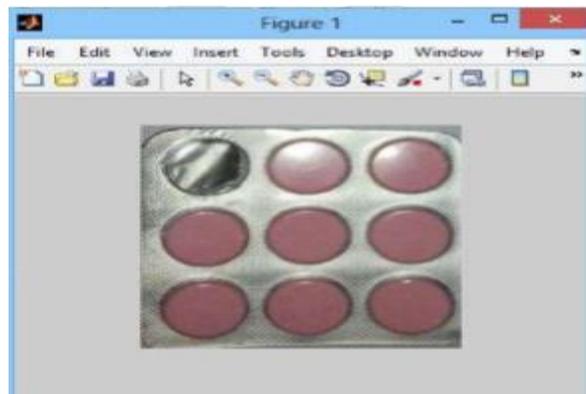


Fig.3: Input image for feature extraction

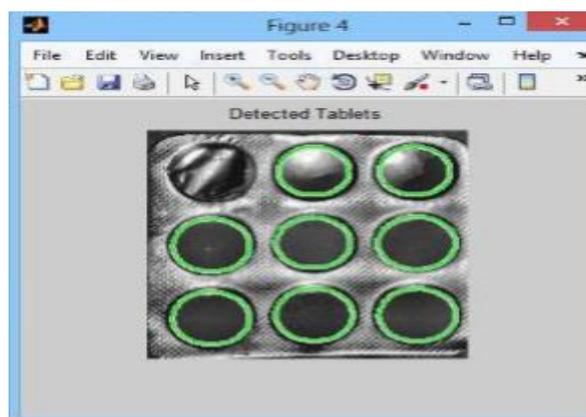


Fig.4: Output image for feature extraction

Sasmita Mishra [2] has proposed a traditional method in which the edges of different tablet images are computed by using the concept of center of mass with Prewitt Operator. The Prewitt operator is based on convolving the image with a tiny, distinguishable, and integer valued filter in horizontal and vertical direction. This operator uses two 3x3 kernels which are convolved with the original image to calculate the approximations of derivatives, one for horizontal changes and another for vertical. The resulting gradient approximations can be combined to give the gradient magnitude by using:

$$\theta = a \tan 2(G_y, G_x)$$

where, for example, θ is 0 for a vertical edge which is darker on the right side. Using this information, gradient's direction can also be calculated.

Huvaida Manzoor [3] came out with a Edge detection technique using statistical method which is used to detect the defected tablets. Initially, RGB image is converted into gray-scale image and then to binary. In order to remove the noise in binary image, morphology opening is used. After

pre-processing, the boundaries of the output are detected. Then the area and perimeter of each tablet are found to determine the roundness of tablet and then the Metric is found. If the metric is closer to 1, then it indicates that tablet is not broken or is completely round. The area and perimeter can be calculated by using the formula given as following :

$$\text{Area} = \pi * r * r$$

where "r" is the radius of a circular tablet.

$$\text{Perimeter} = \pi * d$$

where "d" is the diameter of tablet.

$$\text{Metric} = 4 * \pi * \text{area} / \text{perimeter}^2$$



Fig.5: Input image for statistical method

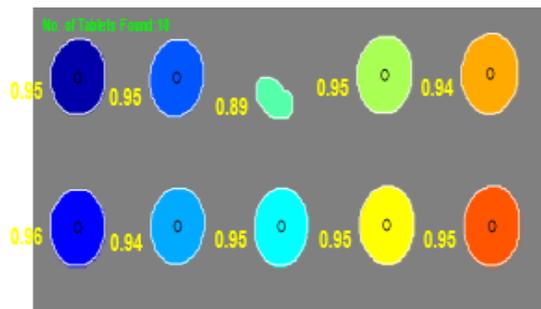


Fig.6: Output image for statistical method

Munish Kumar [4] proposed a method in which the broken blister is detected by using Canny and RC algorithm. At first, the image is captured and given to the system as input. Then, Pre-processing of the input image should be done. Pre-processing steps includes conversion to gray-scale image called thresholding and Image enhancement which involves removal of noise. This image is then filtered using the low pass filter operator called Canny Edge detector, which is used to obtain each tablets boundary in a blister. A template image without any defect is already saved in the system. The template image undergoes all the process similar to the test image. This image is then compared to the template image. The pixels are calculated for both the images and compared. If the template image pixel is greater than the input image pixel then there is a defect in the blister. The user is provided with the output console with the alert message and the number of pixels.

Hardeep Karur[5] has put forward a method in which Harris Algorithm is used. The first step is the Pre-processing of the input image. Image enhancement is used as Pre-processing tool. The best denoising method is median filtering . Harris Algorithm is used for feature extraction and Pattern Recognition. The main components in this algorithm are detection, description and matching. In detection, identify the interest points and then to get the corner score of the pixel . The M matrix for the image is then computed. Points with larger corner response that is greater than some threshold are found. In description, extract the vector feature descriptor surrounding each interest point that is Correlation matrix is determined around interested points. Take the points of local maxima ,i.e., Perform non-maximum suppression. Finally, find the correspondence between the descriptor in two views by Auto-correlation. If there is a correlation mismatch,

then defects are detected. This work approach cover all the aspects of defects related to the shape, size and the surface defects of the pharmaceutical capsules.

SURVEY SUMMARY

The literature survey mainly concentrated on the detection of the damaged or missing pharmaceutical medicine during their manufacturing process. In order to avoid the side effects that may be caused due to the consumption of these defected drugs. They should be checked properly for damages before being sent to the medical stores. Since manufacturing takes place at a larger scale it is a very challenging job to test each specific tablet manually. Therefore, it is essential to make an automated process.

Enhanced Feature Extraction technique [1] is implemented with different tablet strips and capsule blisters. The Center of Mass method easily detects broken and missing tablets. The color detection method can detect any color of capsules in the blister only by changing the value of color. Thus we can say that both the methods are easy to implement and shows their results precisely.

The Centre of Mass (COM) edge detection technique with Prewitt Operator[2], is used for detecting edges by knowing the center of the tablets. This method can be used as a template for multi-scale edge detectors for processing with different images. From the experimental result and analysis, it is concluded that the COM with Prewitt Operator Technique provides better result.

Edge Detection using a Statistical Method [3], is used to find the defective tablets. This method can determine the defective tablets only if the tablet is circular in shape. The circular tablets have a particular area. If the tablets are broken, they deviate from the roundness. So in this way defect can be detected. It is concluded that the whole process takes 2 seconds of time. Linux Debian 5 has a greater speed, so it is recommended to use this machine for operation.

Canny Edge Detection and RC Algorithm [4], is used to find the defective tablets in the strip. It consists of the steps which includes pre-processing, edge detection, and template matching and calculating the matching percentage. It was implemented with different samples of capsules and tablets. This approach covers all the aspects of the defects related to shape, size of the Pharmaceutical drugs. This algorithm can be implemented in various digital Image processing environments and it can be a part of complex automated manufacturing and testing system.

Harris Algorithm [5], is used for Feature Extraction and Pattern Recognition. Using this algorithm, the corners are detected where the window detects change in intensity in all directions. It finds the defects related to shape, size and surface defects of the pharmaceutical capsules.

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