

# Enhanced Center of Mass Technique for Detection of Missing & Broken Pharmaceutical Drugs

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## Abstract

Medication has become more significant in everyone's life people are affected by many diseases. There are certain diseases which cannot be cured without medication. A vast amount of different pharmaceutical products that is tablets and capsules are produced, recommended and consumed everyday worldwide to cure the disease. During production there may be damages like breakage, cracks exist in the tablets or capsules. There may be side-effect of these defected drugs when consumed. So these medicines should be properly checked for any kind of damage before being sold to the consumers. Since large amount of medicines are produced every day so manual inspection of these medicines is very challenging task and it consume more time. Therefore, a system is required to make this process automated. So, this paper proposed a method to inspect damaged and missing tablets with Centre of Mass (COM) edge detection. This method suggests finding edges of tablets by knowing their Centre. The no of capsules in the blister are calculated by Centre of Mass (COM) edge detection method.

**Keywords:** Centre of Mass, Pharmaceutical Drugs, Capsules, Broken tablets, Missing Tablets

## I. INTRODUCTION

Image Processing engage techniques and algorithms for processing the digital images. Image processing provides benefit to science and technology as on modern society digital images have a greater impact [3]. In image processing an image is altering into digital form and perform some operations on it, in order to draw out some useful information or to get an enhanced image from it [4]. We use image processing, such as taking picture from camera, making videos. Taking pictures from camera is called Image Acquisition, and camera is the source of the picture. Also, we can edit these pictures and extract some features or parameter of the pictures. We can apply filters on the picture according to our requirement. This is called Image Enhancement. The size of the image can be reducing by reducing their pixels, this helps in storage of more picture is called Image Compression. By using image cropping we can extract some part of the image. Thus, image processing has an immense number of fields with various techniques. One of the image processing technique is edge detection technique [1].

### A. Edge Detection:

Edge detection is the method of detecting significant disruptions between various points in an image. Edge detection is the primary step applied on digital images, which is used for extracting useful information about the image like size, shape of objects [5]. Edge detection has a major role in the medical science e.g. heart analysis, Brain MRI, Lungs CT scan etc. In Pharmaceutical industries, drugs i.e. Tablets and Capsules are produced at a large scale every day. it is not advisable to consume pharmaceutical drugs with defects. There may be side effects in consumption of broken drugs. So, appropriate inspections of these pharmaceutical drugs are required. But manually it is not an easy task to inspect such a large scale production. For such a large scale production insection , automated tools are required so the inspection of these drugs can be done in short time period [1]. The proposed technique detects the strips with broken and missing tablets and to count the number of capsules in a blister.

## II. RELATED WORK

At present we found that many researchers had done work towards the edge detection of broken and missing pharmaceutical drugs and in the meantime, few research reports are published recently & tried to solve the problem associated with them. Many of the journals and research papers published during the above span 2009-2015 have been studied. The various aspects of the problem were studied.

Ramya.S et.al, proposed some ideas to determine the damaged tablets after production. This is a series of process involving image enhancement, filtration, pixel calculation, segmentation, thresholding, subtraction, de-noising and region based statistic to determine the broken tablets. In case of capsule a feature extraction technique is use to find the defective blister.[3]

Aleksandar Jevtic et .al, recommended a fast edge detection and calculate image gradients Centre of Mass (COM). This method uses integral image to fast computing. The algorithm work with a constant number of operations per pixel independently from its scale. As distinguished with the conventional edge detector such as Sobel edge detector, this new method performs faster when

region size is larger than  $9 \times 9$ . This method can be used as framework for multi-scale edge detectors when the goal is to achieve fast performance [2].

Munish Kumar Dhiman et.al, recommended an approach for automatic analysis of broken pharmaceutical drugs. This approach is used to find out the defects in tablets and based on canny edge detection and RC-algorithm. It gives the percentage of matching distinct pharmaceutical drug blister. The image of the blister without any damage is taken as template image which go through pre-processing step same as input image. input image compared with template image and display the result of two matching different blisters.[4]

Hardeep Kaur et.al, proposed an approach of different image processing techniques for detection of defective capsules. The production of two part gelatin capsules needed a quality inspection system that not only keeps up with the high production throughput, but also achieve accurately and reliably. The Proposed approach covers all the aspects of defects related size , shape and surface defects of the pharmaceutical capsules. The algorithm can be implemented in various digital image processing environments and can be part of multiplex automated testing and manufacturing system. [8]

Dipti et .al, presents an idea to inspect damaged tablets and missing capsules. A novel method is introduced i.e. detection of missing and broken pharmaceutical drugs with Centre of Mass (COM) edge detection method. This method is use to find the edges of tablets by knowing their Centre. The missing capsules in the blister also audited by Centre of Mass (COM) edge detection method. [1]

Amit Chhabra et.al, suggested a sequential hybrid approach to overcome all the limitations of existing edge detection algorithms. The operations achieved by image edge detection algorithm can be computationally expensive and takes lots of time of execution for processing the data. Hybrid color based image edge detection technique is improved by using the data parallelism approach. The comparison between parallel and sequential edge detection will be drawn based upon different parallel metrics. [5]

Ritesh Chavda et.al, proposed some ideas to analyze the damaged tablets after production. A morphological operation is use to detect the defects. Image segmentation is applied and the input image is filtered to eliminate the noises to make the input image that is fit for further processing. The image is deducted by inscribing rectangles with morphological operation. Then the image is take out from the original gray image that identifies the broken tablets. Pseudo colouring is applied and the broken tablet pixel is computed. The input image undergoes pre-processing. Objects are recover depend on the region based properties. Detected Corners are compared with the stored image. If the detected points in the stored image and the test image capsule match, then it is accepted otherwise rejected. [7]

### III. PROPOSED WORK

Number of methods are available for the detection of broken or missing pharmaceutical drugs. Here, we propose a new technique that detects the pharmaceutical drugs of arbitrary shape using Center of Mass. Figure1 shows the proposed system architecture .The center of each tablet in strip is detected by using Center of Mass , if centers are detected then tablet is present in the strip, if not then tablet is broken or missing. Similarly, we applied Center of Mass to count the no of capsules in the blister. We take image is of the blister with all Capsules present in it. Find the distance between the Center of Mass with all the pixels along the boundary for each object. Find out the range and select the object id having greater than equal to selected range. Total no of capsules present in the blister is calculated.

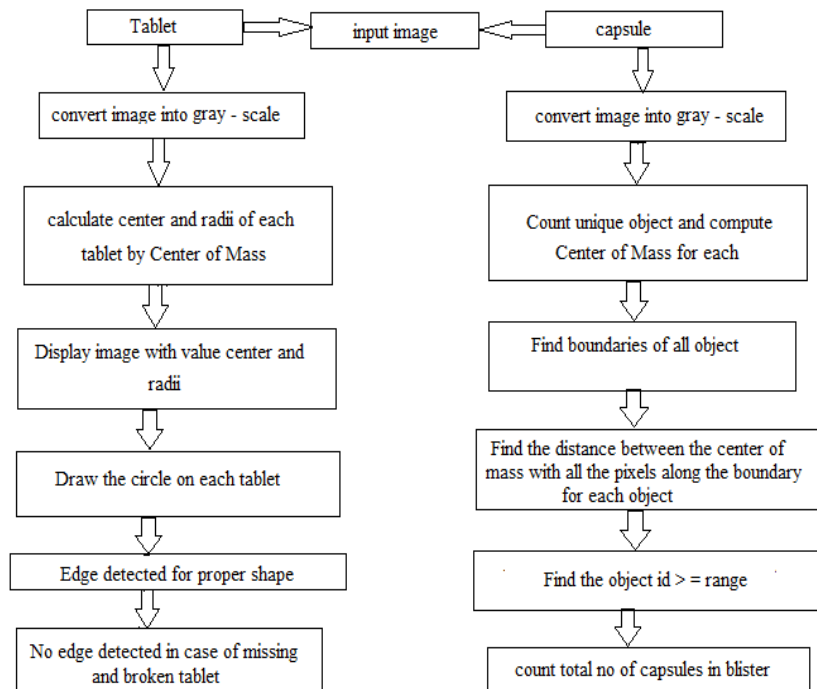


Fig. 1: Architecture of proposed System

The algorithms for these method shown below:

**B. Algorithm for Finding Broken or Missing Tablets:**

- Step 1: Input the tablet strip.
- Step 2: Convert the image into Gray-Scale.
- Step 3: By applying center of mass method, calculate the centers and radii of each tablet in the strip.
- Step 4: Display image and value of centers and radii of each tablet.
- Step 5: Draw the circle on each tablet of strip.
- Step 6: Edge Detected if tablet is present in the strip, if tablet is broken or missing edge is not detected.

**C. Algorithm to Calculate No of Capsules in a Blister:**

- Step 1: Input the capsule blister.
- Step 2: Convert image into Gray- Scale image.
- Step 3: Count unique object and compute Center of Mass for each.
- Step 4: Find boundaries of all object.
- Step 5: Find the distance between the Center of Mass with all the pixel along the boundary.
- Step 6: Find those object id which are greater than range.
- Step 7: Calculate the no. of capsules in the blister by using this range.

**IV. RESULTS AND DISCUSSION**

The proposed Method is implemented with different Tablets strip and different Capsule Blisters. The Center of Mass is use to calculate the center and radii of each tablets and It draws circle on the image where tablet is present and in case where the tablet is absent it does not draws the circle. The method applied for different shapes of Capsule also to calculate the total no of capsules present in a blister. This method find the distance between the Center of Mass with all the pixels along the boundary for each object and find those object id which are greater than equal to selected range.

**A. Input Image and Detected Edge**

Fig 2 shows all tablets present in the strip. It draws circles on the image where tablets present as shown in Fig 3. Similar process is undertaken for input images shown in fig 4.and resultant image shown by fig 5.



Fig. 2: Input Image of Tablet Strip



Fig. 3: Resultant image of the input image



Fig. 4: Input Image of Tablet Strip

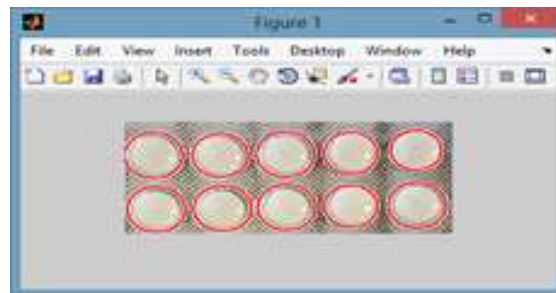


Fig. 5: Resultant image of the input image

**B. Input Image with One Missing Tablet and Detected Edge:**

Fig. 6 shows the image of tablet strip of one missing tablet and Fig. 7 shows the resultant image of fig.6. It draws the circles on the image where all tablets present except the absent tablet position.



Fig. 6: Input image of One Missing Tablet

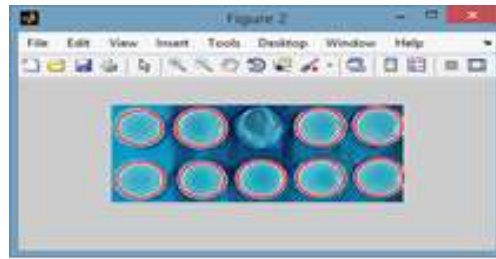


Fig. 7: Resultant Image of input image



Fig. 8: Input image of One Missing Tablet



Fig. 9: Resultant Image of input image

**C. Input image of Broken Tablet and Detected edge:**

Similarly, the broken tablet is detected with the Center of Mass method. As missing tablets are not detected by this method, broken tablets are also not detected. That is broken tablets are not marked by circles. Fig. 10 shows the input image and Fig. 11 shows the resultant image.



Fig. 10: Input image of Broken Tablet



Fig. 11: Resultant image of the Broken Tablet

**D. Input Images of Capsule Blister and Missing Capsule blister:**

For the detection of no of Capsules we applied Center of Mass Method. This method find the distance between the Center of Mass with all the pixels along the boundary for each object and find those object id which are greater than equal to selected range. The input images are shown in fig 12 and resultant image is shown in fig.13 and total number of capsules present are shown in the Fig. 14 in command window.



Fig. 12: Input Image of Capsule Blister



Fig. 13: Resultant Image of Capsule Blister





## V. CONCLUSION

Pharmaceutical drugs are the need of Human life to cure disease. inspection of these drugs should be done carefully. There are a lot of automated tools for this inspection. The proposed method Center of mass easily detects broken and missing tablets and also calculate the no of capsules of arbitrary shape in blister. Thus we can say that this method is easy to implement and showing their results precisely and fast. Center of Mass method is implemented using different tablet strips and capsule blister. In both cases, it gives better results.

## REFERENCES

- [1] Dipti , Rajiv Bansal, "Enhanced Feature Extraction Technique for Detection of Pharmaceutical Drugs", International Journal of Engineering Research and General Science (IJERGS) Volume 3, Issue 3, May-June, 2015 ISSN 2091-2730
- [2] Bo Li, Aleksandar Jevtic, Ulrik Söderström, Shafiq Ur Rehman, Haibo Li, —Fast Edge Detection by Centre of Massl Proceedings of the 1st IEEE/IAE International Conference on Intelligent Systems and Image Processing 2013.
- [3] Ramya. S, Suchitra. J , Nadesh R.K, —Detection of Broken Pharmaceutical Drugs using Enhanced Feature Extraction Techniquel, International Journal of Engineering and Technology (IJET), Vol 5 No 2 Apr-May 2013.
- [4] Munish Kumar Dhiman, Dr Rajat Gupta, —Detection of Broken Blister using Canny and Rc-algorithml International Journal of Scientific Research Engineering & Technology (IJSRET), ISSN 2278 – 0882 Volume 3, Issue 3, June 2014.
- [5] Chinu, Amit Chhabra, —A Hybrid Approach for Color based Image Edge Detectionl International Conference on Advances in Computing, Communications and Informatics (ICACCI)/ IEEE/978-1-4799-3080-7/14.
- [6] Ștefan Oprea, Ioan Liță, Mariana Jurianu, Daniel Alexandru Vișan and Ion Bogdan Cioc , ” Digital Image Processing Applied in Drugs Industry for Detection of Broken Aspirin Tablets”, IEEE,ISBN: 978-1-4244-3974- 4, 2008.
- [7] Ritesh Chavda, Devraj Gohil, Ankit Patel, Sunil Hemnani, Miss. Shreya Patel, Miss. Shivangi Patel, —Detection of Defect in Pharma -Tablets Using Image Processingl International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online) Vol. 3, Issue 1, pp: (49-52), Month: January - March 2015.
- [8] Hardeep Kaur, Er.Nidhi Garg, —Inspection of Defective Pharmaceutical Capsules using Harris Algorithml International Journal of Advances in Electronics Engineering, Vol:1 Issue:1 ISSN 2278 - 215X.
- [9] Abha Sharma, Sugandha Arora, lInspection and Classification of Defects in Pharmaceutical Capsules Using Neural Networkl, International Journal of Engineering Research and Development, Volume 1. 10, June 2012