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AUTOMATED HUMAN COLORECTAL POLYP DETECTION IN COLON CAPSULE ENDOSCOPY

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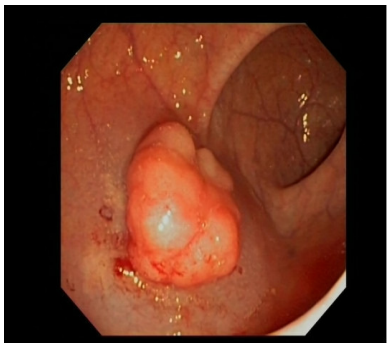
Abstract : **Colon polyps are one of the important forerunners to colon cancer. Colon capsule endoscopy is the one of the good method to detect the colon cancer. Many approaches are developed to detect polyp . But an effective algorithm is to find the polyps are seems to be obsolete. Colon capsule camera are available to endscope . In this paper an efficient algorithms is proposed to detec the colon polyps. In the CCE method the images are taken from the digital camera by passing the capsule through the inner part of the intestine. This video sequences are help to detect the polyp. Texture ananlysis is done after vignetting the image .The binary classifier is the method used to identify the polyps are present or not in the intestine. Binary classifier gives better classification rate.The ball fit radius is the decision parameter of the binary classifier.The algorithm is tested with polyp datasets.**

Index term- Capsule endoscopy, Colon cancer, Polyp detection, ROC curve

I. INTRODUCTION

Colon cancer is the second most common cancer in the women and third most common cancer in the men. Colon polyps are the important forerunner to colon cancer. In this paper colon capsule endoscopy is the method detects the colon polyp. Endoscopy is the method used to examine the person's digestive tract without surgical method. The flexible tube like endoscope is used, camera and light is attached this tube. The result is seen by using a color TV monitor.



The CCE[1],[8],[9] is a capsule method and a small imaging device. This device is ingested by the patient. The capsule is passed through the patient intestine then it records the digital images from the inner part of the intestine. The images are recorded then it is record one recording device is carried in the patient body through wireless method. A single patient contain thousands of frames, it is recorded by using the video. In the existing method create misunderstanding to detect the polyp. Because the mucosal tissues act the structure like polyp. Mainly the polyps are detected by using the methods like colonoscopy, colonogrphy[10] endoscopy, and capsule endoscopy. The main disadvantages of the colonoscopy and endoscopy are it cannot detect the full polyps of the intestine. These disadvantages are overcome by using the colon capsule endoscopy. These methods are described in the proposed methodology.

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II. PROPOSED METHODOLOGY

A. Preprocessing

The capsule endoscopy is do in the absence of the ambient light, but on-board light source is used to capture the images. This process is known as vignetting The endoscopy images are circular shape but the area of the frame is rectangular shape. The solid colors are filled in the circular mask, this create discontinuity in the shape of the circular mask. This is creating problems in the algorithm. This discontinuity is removed by using simple linear exploitation. This simple linear exploitation extends the values from the interior part of the circular mask. This is solving the linear system problems. Histogram equalization is the process used to adjust the contrast by using the image's histogram. Enhancement is the method increase the quality of the images. The adaptive histogram equalization is a contrast enhancement method [11]. Different type filtering methods are used to filter the image. Color conversion methods are generating the texture. In this paper HSV is the good color conversion method to generate the polyp. Based on the color conversion the threshold values are changed.

$$\nabla f.\vec{r} = 1$$

B. Texture computation and convolution

The buades algorithm is used to analyze the texture. This part separates the preprocessed frame f and texture t.The baudes algorithm clearly analyzes the texture and separates the frames. The texture is easily analyzed from the texture. HSV color conversion method generates the texture.

$$f = t + c$$

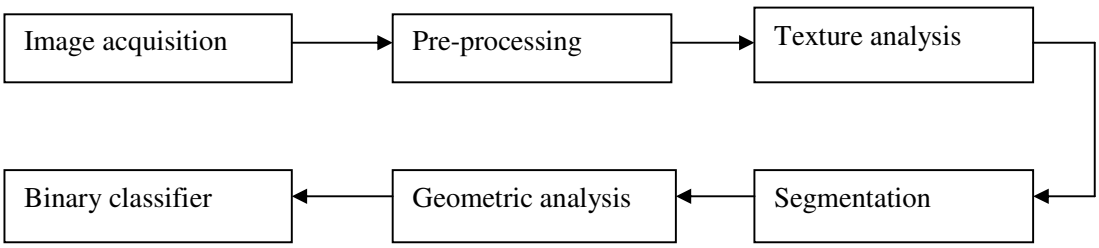


FIG 1:BLOCK DIAGRAM

C. Mid-pass filtering and segmentation

After the pre-selection process the identification of the polyps are done. The protrusions (or) bumps are present in the surrounding of the polyp. The main aim of this step is do geometric analysis. By using the mid-pass filtering the geometrical process is act as too small (or) too large. The mid-pass filter form is

U=H (w). w

Where w is defined by

$$w = \frac{L\sigma 1(f)}{L\sigma 2(f)}$$

And H is the Heaviside step function

$$H(x) = \begin{Bmatrix} 0, if\ x < 0 \\ 1, if\ x > 0 \end{Bmatrix}$$

The separation of each feature is done by using segmentation via thresholding. The multiplication and division are done in pixel-wise.

$$s = H(u - \theta)\epsilon\{0,1\} \quad {}^{Nx*Ny}$$

D. **Geometric analysis**

After the binary segmentation of the frame then do the geometrical analysis it is help the identification of the polyps. Here the simplest filtering criteria are used. The features size is

$$Ks = \{k\ \epsilon\{1,2, \dots, Nc | SL < S^{(k)} < SU\}$$

Where the size $S^{(k)}$ is

$$S^{(k)} = \sum sij^{(k)}, k = 1, \dots, Nc.$$

If the features are too large the folds are normal mucosal tissue. The segmentation and mid-pass filtering is done in very small features.

E. **Segmentation**

After the frame passes the pre-selection, we identify certain regions that may correspond to polyps. An essential feature of polyps is that they are protrusions or bumps on a flatter surrounding tissue. The purpose of this step is to detect such geometric features. Note that the polyps have a certain range of characteristic dimensions. Thus, in order to detect possible polyps, the geometrical processing should act as a *mid-pass filter* that filters out the features that are too small or too large.Here, we use a mid-pass filter of the form The textures are segmented and then find where the polyps are present. Segmentation is the one of the good method to identify the particular point or particular line. Two type segmentations like area segmentation and depth segmentation methods are used in this paper. Area segmentation help to segment the area. The depth segmentation methods are related to the color [12]. Segmentation is the fundamental method of the image processing.

F. **Binary classifier**

Binary classifier helps to identify the normal tissues and polyp tissues. By using the binary classifier algorithm the '0' denoted as normal tissues and the '1' denoted as polyp tissues. The binary classifier is a safe and simple method [4],[5],[13].The proposed algorithm of polyp detection is based on extracting certain geometric information from the frames captured by the capsule endoscope's camera. Such approach is not new, as it has been noticed before that the polyps can be characterized as protrusions from the surrounding mucosal tissue

III. RESULT AND DISCUSSION

This paper describe the colon capsule endoscopy method is used to detect the polyp present in the colon. Pre-processing method is the first step applied in the image. Histogram equalisation is the method help to get a contrast image. Colorspace is the another one important technique applied to do the color conversion. The HSV method reprasented by using RGB color model. Segemenation help to segment the polyp. After this process the polyps are clearly identified.

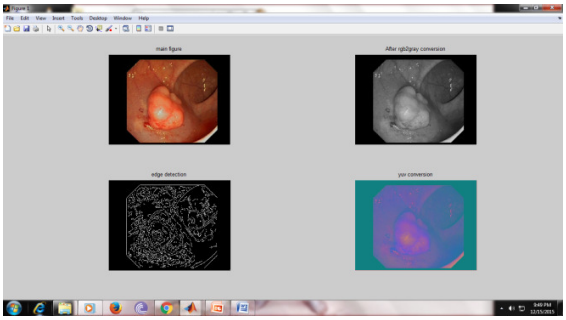
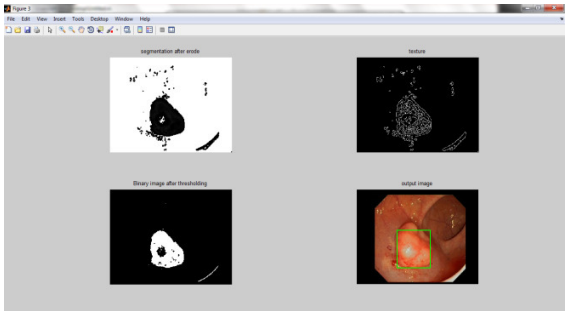


FIG 2 :OUTPUT IMAGES



IV. CONCLUSION

Colon polyp dataset shows the varieties of polyp conditions. The selected images from a video sequence are processed to segment the region . The region is then classified with binary classifier. Different methods are used to detect the polyp present in the colon. This paper shows the colon capsule endoscopy method using to detect the polyp. Colon capsule endoscopy is the one of the good method to detect the colon polyp. Because this method clearly identify where the polyps are present. The images in HSV format is also used to detect the polyps. The algorithm is successfully checked with 50 images

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