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DETECTION OF BLEEDING USING MORPHOLOGICAL AND SEGMENTATION IN WCE VIDEO

R. Nandhinee[1], D. Yashwanthni[2]
[1]M.E scholar, M.N.M Jain Engineering College, Chennai, India.
[2]Assistant Professor, M.N.M Jain Engineering College, Chennai, India.

Abstract: ***This paper describes propose a method to detect bleeding regions from WCE video. To find bleeding regions we are using super pixel segmentation process. Image segmentation is the process of dividing an image into multiple parts that's used to identify relevant information in digital images. Initially the video is converted into frames in that frames we are finding the edges using canny detector. Then we remove the edge by means of morphological dilation. After removing the edges, group the pixel based on color and location using super pixel segmentation. Finally we find the frame contain bleeding or not by using the classifier.***

Index Terms— Edge Detection, Morphological dilation, Super pixel segmentation, SVM classifier

1. INTRODUCTION

The human digestive system, esophagus, stomach, small tipaccelvan's testinal (ie, duodenum, jejunum, and ileum) and consists of a series of different elements, including the colon. Standard digestive endoscopy as a diagnostic tool plays a very important role. For example, as a gastroscopy, colonoscopy endoscopy abundance of a variety of systems that have been used for digestive endoscopies. However, all the methods mentioned above, only to see the small intestine. Problem, Wire-less capsule endoscopy (WCE) ¯ the first movie and combines wireless transmission, which was proposed in 2000 Video Technology [6, 9, 14, 15, 16, 17.18].

Wireless Capsule Endoscopy (WCE) for the purposes of finding a non-invasive technique that enables visualization of the small bowel mucosa. WCE patient swallowed and it is passively driven by peristalsis. Capsule endoscopy is the most common symptom of obscure gastrointestinal bleeding rate. Early systematic studies of patients with Crohn's disease, according to the most useful diagnostic tool; Furthermore, the WCE small bowel cancer survival [1,18,19] is expected to be based on a clinical benefits. Figure 1, Figure 2, wireless capsule endoscopy, 26mm × 11mm measures shown in a short focal length CMOS camera, light source, the battery and the radio transmitter is a device that contains the form of a tablet. We first introduce how it works in a nutshell. After WCE 12 hours of a meal can be swallowed by a patient, this portable device is operated by peristalsis begins work and record the images while moving forward along the digestive tract. Meanwhile, the images recorded by the Camera attached to the waist with a special recorder wireless transmitted. Up to eight hours of battery ends WCE this process continues. Finally, special recorder, a personal computer or a computer workstation download all the image data, and view the images and can analyze a variety of diseases and medical sources Gastrointestinal (GI) tract. Doctors said that it is very time-consuming process of paying the diagnosis diagnosis is not a real-time system, and therefore, due to the large amount of video. In this situation, the off-line post-processing and computer aided diagnosis are a viable option. WCE 2001 American Food and Drug Administration (FDA) has not approved, it is said that this new technology shows gastrointestinal bleeding, Crohn's disease, ulcers and other diseases of the digestive great value rate [2.18].

Image segmentation is the process of obtaining specific areas from the images. Edge detection, edge extraction, segmentation methods are all too common Clustering. Edge detection identifies the need of points around the edge. The extract was separated from the edge of the image indicates the area outlined. Most of pixels in an image segmentation methods based on information such as the intensity of the color, the color of the pixels that have any similarities in the cases with the combination groups, based on the areas of methodologies. Image section, but it would cost a considerable computation time and was not present in this sense it is a great platform for implementing a knowledge database, it would require a much greater knowledge of the use of human beings. In addition to the traditional segmentation methods, some of this knowledge to model the segmentation methods is trainable.

An artificial neural network segmentation using neural networks, neural network or an image processing relies on small areas. After processing, neural networks, decision-making mechanism authorized by section indicates which parts of an image. Specifically designed for this type of network is Kohonen map. Pulse coupled neural networks (PCNNs) high-performance image processing biomimetic modeling a cat visual cortex neural models are proposed and developed. In 1989, Eckhorn cat's visual cortex, a neural model to follow technique is introduced. Eckhorn model for studying the visual cortex of small mammals provided a simple and effective tool, and as soon as it was felt that the image processing are likely to be significant. In 1994, Eckhorn neural network model that the algorithm along with the beat Johnson, who was followed by an image processing algorithm. So the image segmentation, feature generation, face extraction, motion detection, region growing, noise reduction, and the last ten years, PCNNs applications, including image processing, has been using a variety. A neural network is a two-dimensional PCNN. Each neuron network with its corresponding pixel's color information to an external stimulus (eg, intensity), receiving an input image corresponds to one pixel. Each neuron receives stimuli from them locally; connect to its neighboring neurons. It is a pulse output for external and local stimuli, resulting in a dynamic range that exceeds an internal activation system which accumulates stimuli, combined.

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2. RELATED WORK

Breddermann and Vary formulated a Rate Compatible Insertion Convolutional (RCIC) WCE which were known as dummy bits. The dummy bits were inserted into the information bit sequence at turbo encoding. It offers better apri knowledge to the mother decoder. A Hybrid Automatic Repeat request (HARQ) scheme for BLEEDING DETECTION based on the RCIC WCE was also presented to obtain higher throughput [6]. *Breddermann and Vary* provided a hybrid ARQ scheme for UMTS BLEEDING DETECTION based on insertion convolutional turbo codes. UMTS BLEEDING DETECTION performs a rate matching and HARQ was applied to deliver adequate performance over a wide range of channel conditions. The rate matching scheme was performed based on bit repetition and bit puncturing. UMTS BLEEDING DETECTION was realized based on the fixed rare convolutional turbo code. RCIC WCE proved considerable performance gains in systems without HARQ [7]. *Beermann et al* proposed a rate compatible Low Density Parity Check (LPDC) codes using optimized dummy bit insertion. This scheme addresses the problem of using one mother code and marching arbitrary code rates. It was lesser than the mother code rate by appending the bits into the information bit sequence prior encoding. A novel rule was presented to determine the optimized positions of dummy bits within the information bit sequence appropriate for LPDC codes [8]. *Nistazakis et al* formulated an estimation of outage capacity for free space optical links over I-K and K turbulent channels. The performance was based on the atmospheric conditions in the link area. The closed form expressions for the calculation was also derived [9]. *Fowdur et al* designed a modified asymmetric bleeding detection WCE with reliability based on hybrid ARQ. The modified bleeding detection WCE includes an asymmetric encoder and it uses a diverse channel reliability at iterative decoding. An adaptive extrinsic scaling factor was incorporated in the decoder to improve its performance and deliver a stopping criterion [10].

Heath et al designed a distributed antenna systems for the downlink of cellular systems. The research trends in distributed antennas for the downlink of cellular systems were described. The fundamental observation were tightly integrated into the cellular architecture [11]. *Kasai et al* introduced a quantum error correction beyond the bounded distance decoding limit [12]. *Han et al* presented a maximum likelihood soft decision decoding for binary linear block codes based on their super codes. It used the Viterbi algorithm backwardly to a trellis derived from the parity-check matrix of the super code of the linear block code [13]. *Song et al* proposed a hybrid maximum likelihood decoding for linear block codes. The convolutional and block codes were hugely used in digital communications. Word correction method can be applied to use the channel measurement information to decode the clock codes [14]. *Chatterjee and Singh* presented the analysis of turbo coded OFDM performance in a frequency selective fading channel along with AWGN. The incorporation of powerful turbo code and OFDM could mitigate ISI and the additive noise at minimum SNR [15].

Breddermann et al proposed a new Hybrid Automatic Repeat request (HARQ) for offering adequate decoding performance over a conditions of wide channel range. This scheme was employed for bleeding detection based on the RCIC turbo codes. By the integration of a low rate RCIC code and a low complexity ring buffer, the effort of performance and implementation was obtained well than the conventional HARQ scheme of bleeding detection [7]. *Jego and Gross* introduced a novel simplification of the ABP algorithm for the turbo decoding of product codes via the BCH component codes. It has high degree of parallelism for high data rate applications and lower decoding complexity. This scheme necessitates fewer iterations than the traditional ABP algorithm [16]. *Stoian and Perisoara* presented a block turbo code, which was constructed by the extended hamming codes. Depending on the soft decoding and a soft decision of the component codes, these codes were further decoded using the block turbo decoder. This system provides the better unequal error detection, joint error detection, and error correction [17].

3. IDENTIFICATION OF DEFECTS USING WCE VIDEO USING SEGMENTATION AND SVM CLASSIFICATION APPROACH

To find the bleeding present in the WCE video we use the superpixel segmentation and classification based on the Support Vector Machine Classifier. In that the given video is preprocessed to remove any information present in the video. In pre-processing we converting a video as frames. A picture frame can vary depending on the size of the still image format or motion picture film format. Complete with a picture frame or video frame forming the moving image (or nearly so) is one of a number of pictures. Video will be read. Video is not a rules change. Lawyers stored converted.The median filter removes the noisy pixel in the image by finding the noisy pixel in the image and replacing the noisy pixel with the median value of the pixels.

The resulting image will look smoothened comparing to the original image. The median filter is a common filter for all the type of noises and it does not have any special designation based on the type of noises. After video is converted into frames, then we find the edges using canny detector. Here for Edge Detection has been performed by canny edge detector. Accept the risk of the edge detector to detect a wide range of films the edges, using a multi-stage algorithm that is an edge detection operator. First, a Gaussian blur to clear any speckles and noise-free image is used. Slope with a gradient operator 'intensity and direction of application. Than its neighboring pixels is a good candidate for a node to determine if the non-maximum suppression. Hysteresis Thresholding starts and finds the edges. Edge detection process and pixels in the x-y position of the first derivative obtained. In the direction perpendicular to the edge of the horizontal and diagonal angle representing four angles rounded.

The procedure has been used all over the image. Expulsion, regularly review the operation and expansion of the shapes in the input image using a structuring element. This is the first film to be dilated. The second is a structuring element (called a kernel), also

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known as the coordinate points of a (usually small) is set. Structuring element that determines the exact effect of the removal of the input image. F a structuring element s (denoted FS) an image by extension, the building element of the input image f hits a structuring element of origin, of all places, the (x, y) is a new binary image g = FS produces all of the pixel coordinates (x, y) for the back, otherwise, 0 hits, ie f and g (x, y) = 1. In regions of the inner and outer limits of the expulsion of the pixels and adds a layer of irritation has the opposite effect. We remove from the edges of the frames using kurupattut expulsion. Frames and a wide color space based on the use of a uniform division super pixel pixels from that group, divided. This super-pixel-by-layer compositing pixel image can be complicated to balance.

Extended an early seed development-oriented approach is introduced here. Using this method, the evolution of the curve instead of finding clusters of pixels, the similarity of views. Therefore, to achieve better and faster performance. Color similarity, and spatial similarity is measured. Have been used to group the pixels in the areas of similarity. Similar pixels in the image of the initial seed point viruttattirk is growing. Seed starting point is given by the sign of the intensity of the area needed to be separated. Similar pixel values near the seed point in the circuit can be identified by their center points. Connected by finding similarity between adjacent pixels in the center of the area.

SVM classifier frames with areas of bleeding to find work. It's a learning algorithm is used for detection. On this basis, only videos received. SVM model with a clear space is divided into separate categories as broad as possible also points mapped space is a representation of such examples. Then also mapped in the same place and they have a new one based on a genre which side of the gap is projected to fall. Satisfy the conditions of the input data points are validated. Input data can be classified on the basis of the previous level. Finally we have an assortment of common performance measures of sensitivity, specificity, and accuracy of the analysis. Expulsion, regularly review the operation and expansion of the shapes in the input image using a structuring element. This is the first film to be dilated. The second is a structuring element (called a kernel), also known as the coordinate points of a (usually small) is set. Structuring element that determines the exact effect of the removal of the input image.

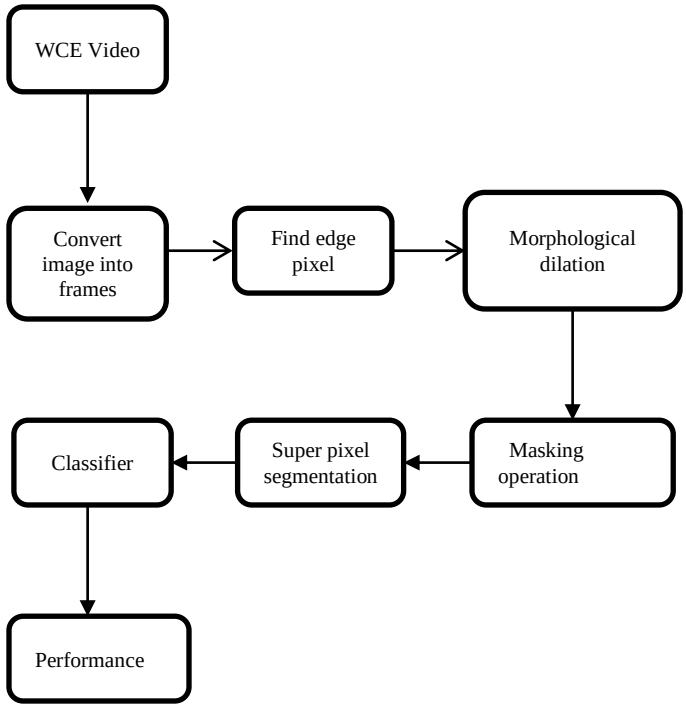

Fig.1 Flowchart of the proposed WCE modeling process.

3.1 FRAME CONVERSION

In pre-processing we converting a video as frames. The size of a film frame varies, depending on the still film format or the motion picture film format. A film frame or video frame is one of the many still (or nearly so) images which compose the complete moving picture. The video will be read. And we convert the video as a frames. The converted frame will be saved. The median filter removes the noisy pixel in the image by finding the noisy pixel in the image and replacing the noisy pixel with the median value of the pixels. The resulting image will look smoothened comparing to the original image. The median filter is a common filter for all the type of noises and it does not have any special designation based on the type of noises.

3.2 EDGE DETECTION

Here for Edge Detection has been performed by Canny edge detector. The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. First, A Gaussian blur is applied to clear any speckles and free the image of noise. A gradient operator is applied for obtaining the gradients' intensity and direction. Non-maximum suppression determines if the pixel is a better candidate for an edge than its neighbors. Hysteresis thresholding finds where edges begin and end. The edge detection process the first derivative in the x and the y position of the pixels were obtained. The edge direction angle

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is rounded to one of four angles representing vertical, horizontal and the two diagonals. The process is employed all over the image.

3.3 MORPHOLOGICAL DILATION

Expulsion, regularly review the operation and expansion of the shapes in the input image using a structuring element. This is the first film to be dilated. The second is a structuring element (called a kernel), also known as the coordinate points of a (usually small) is set. Structuring element that determines the exact effect of the removal of the input image. F a structuring element s (denoted FS) an image by extension, the building element of the input image f hits a structuring element of origin, of all places, the (x, y) is a new binary image g = FS produces all of the pixel coordinates (x, y) for the back, otherwise, 0 hits, ie f and g (x, y) = 1. In regions of the inner and outer limits of the expulsion of the pixels and adds a layer of irritation has the opposite effect.

3.4 SUPER PIXEL SEGMENTATION

This Super Pixel Segmentation can balance image complexity through pixel grouping. Here introduced an initial seed growth based approach extended. This method considers pixel similarity to find clusters instead of using curve evolution. So as to achieve better and faster performance. The color similarity and the spatial similarity is measured. The obtained similarity is used for grouping the pixels into regions.

3.5 SVM CLASSIFIER

It's a learning algorithm is used for detection. On this basis, only videos received. SVM model with a clear space is divided into separate categories as broad as possible also points mapped space is a representation of such examples. Then also mapped in the same place and they have a new one based on a genre which side of the gap is projected to fall. Satisfy the conditions of the input data points are validated. Input data can be classified on the basis of the previous level.

3.6 PERFORMANCE

Process performance is measured by measuring the accuracy of the process. Accuracy is measured by comparing the ground truth images. As a result of the high accuracy of the images indicates that the cluster is very similar to the reality on the ground.

$$ACC = \frac{(TP + TN)}{(FP + TN) + (TP + FN)}$$

True positive = correctly identified
False positive = incorrectly identified
True negative = correctly rejected
False negative = incorrectly rejected

3.7 ALGORITHMS USED SUPERPIXEL SEGMENTATION

Similar pixels in the image of the initial seed point viruttattirk is growing. Seed starting point is given by the sign of the intensity of the area needed to be separated. Similar pixel values near the seed point in the circuit can be identified by their center points. Connected by finding similarity between adjacent pixels in the center of the area.

3.8 SUPERPIXEL METHOD

Computer vision algorithms in multi-pixel-based representation of the use of the grid. For example, Markov random fields, such as images, the stochastic models, often defined as a regular grid. Or, face detection is usually a fixed amount for each image (say, 50x50) is made to match the templates stored in the window. Pixel grid, however, does not represent a natural visual scenes. This is a digital imaging process an "artifact" is. It is derived from the integrity of the process is a low-level grouping of companies with meaningful work, more natural, and presumably would be more efficient. For example, 500 segments (what we call super pixels), that is, an image can apply the algorithm to partition Normalized cuts.
Many of the properties desired for such a super pixel graph: This is computationally efficient: it reduces the complexity of the images from a few hundred to hundreds of thousands of pixels super pixels. It is more efficient units between representationally pairwise constraints, only adjacent pixels of the pixel grid and now less far to model interactions between super pixels can. Super pixels perceptually meaningful: each super pixel balanced unit with a sincerity that is to say a super pixel all pixels, color and texture, are often not the same. It is almost perfect: super pixels an over segmentation results, because the image of most structures have been preserved. Moving from the grid is very little loss Super pixel map. It is actually used on later-stage visual processing speed super pixels or novel atom; the idea of community has been around for a while. What we have done: (1) empirically validate the integrity super pixel maps; and (2) as static images, which challenges people to find and solve problems with a view to apply it.

3.8.1 Super pixels from the Normalized Cuts

The Normalized Cuts is a classical region segmentation algorithm developed at Berkeley, which uses spectral clustering to exploit pairwise brightness, color and texture affinities between pixels. We apply the Normalized Cuts to over segment images to obtain super pixels. In our experiments, to enforce locality we use only local connections in the pairwise affinity matrix.

3.8.2 Patches and Labels

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Where is the link? According to the Post, or die, in the open literature, a technical term "affiliate" of ancient origin (the term before it can have, but it's still difficult to track back) textural features for image classification was Haralick 1973 paper. In the old days, the pixels are "called" and the small area of 3 × 3 pixels generally refer to a window or a link. Seven years later, JS Lee precursor sheet on image enhancement, local statistics (eg, mean and variance) additive or multiplicative noise removal filter is calculated in terms of connectivity through a link in order to drive. In the early 1980s, the optical flow computing (eg, horn mode) or imbalance in the field (eg, lukas Kanade algorithm) from a couple of shots in the field of image intensity gradient of a connection at home, on the assumption that there can be calculated in connection different time or batch transfer window. The large amount of image data representing an image is not an abstraction. Image samples to establish guidelines to help fulfill the mission of a particular film. Depending on the particular task (eg, abstract vs. recognition), we often have to meet two classes of models of the image - the image analysis and synthesis tasks associated respectively to explain the often generative. Descriptive models that will facilitate the task of separating the various classes, such as a picture from the unique features of a particular image on extraction. Explain the features of the image can be reconstructed from authentic samples is irrelevant. Instead, a picture of the reproductive models "information" is to protect the ability to set their classification and recognition is more desirable than the abstract and puts them in the work of restoration. However, sparsely- recognition based on the latest trend of reproductive models challenge the common perception - even though they do not have the ability to set the most efficient performance in recognition tasks can be achieved. Both descriptive and generative models are generally called a challenge. Following the collapse of the 10 pixels of an image generally, the higher dimensional models directly is often impractical or impossible. "Link" is where the concept can be useful - instead of working with the whole picture; we can focus our attention on a small area called. Why is this a good idea? Class, local patches often experience less distortion than the universal images to define the similarity between the two local connections easier. The idea is to sift the local binary pattern (LBP), surf and AFFINE Heads (ASIFT) is the key to the success of a class of local Key point descriptor. Demonstrated outstanding performance and the increasing influence of the local, but our interest here is a connection-oriented class has focused on reproductive models. Although the labeling of high dimensionality of color images and data are processed, linked binary digital images used in the areas of computer vision to detect. When combined with an image recognition system or human-computer interaction interface, connected component labeling can be run on a variety of information. Thresholding blob extraction step is usually the result of a binary image is performed. Filter thread counts, will be monitored. One of the edges connecting vertices in a graph is constructed from the respective input dataThe vertices contain information required by the comparison heuristic, while the edges indicate connected 'neighbors'. An algorithm traverses the graph, labeling the vertices based on the connectivity and relative values of their neighbors. Connectivity is determined by the medium; image graphs, for example, can be 4-connected or 8-connected.

3.9 SVM CLASSIFIER

The SVM is a supervised classifier that classifies the images based on the features extracted. The train feature vectors were projected in the hyper planes and the feature vectors that are belonging to the particular category is identified. The test feature vector is then identified to be belong which of the category. The SVM classifier is a binary classification method.

Support vector machines are supervised learning models with associated learning algorithms that analyze data and recognize patterns used for classification and regression analysis. The basic SVM takes a set of input data and predicts, for each given input, which of two possible classes forms the output, making it a non-probabilistic binary linear classifier. Classification accuracy is computed. SVM maps input vectors to a higher dimensional vector space where an optimal hyper plane is constructed. Among the many hyper planes available, there is only one hyper plane that maximizes the distance between itself and the nearest data vectors of each category. This hyper plane which maximizes the margin is called the optimal separating hyper plane and the margin is defined as the sum of distances of the hyper plane to the closest training vectors of each category.

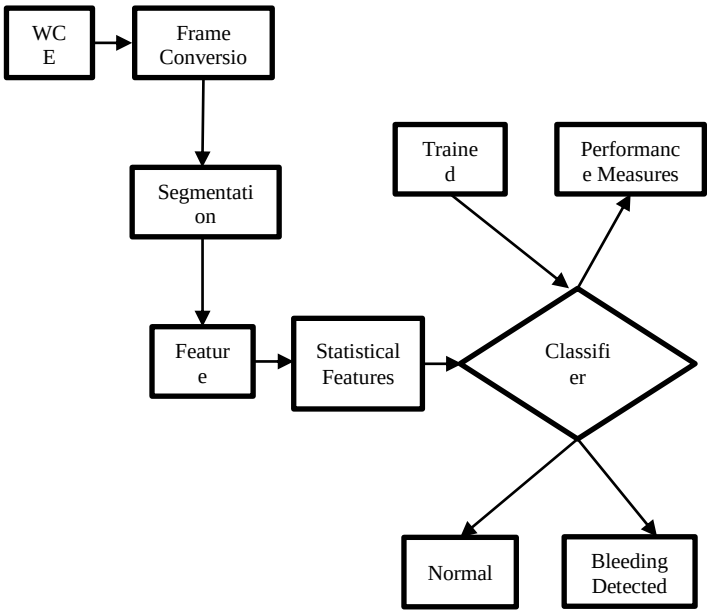

Fig.2 System architecture of the proposed WCE modeling process.

4. PERFORMANCE ANALYSIS

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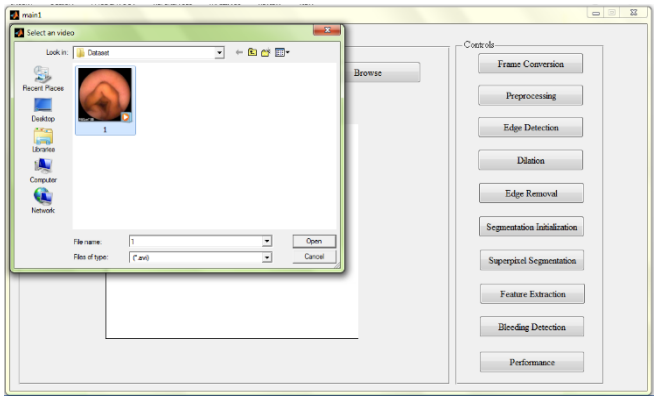

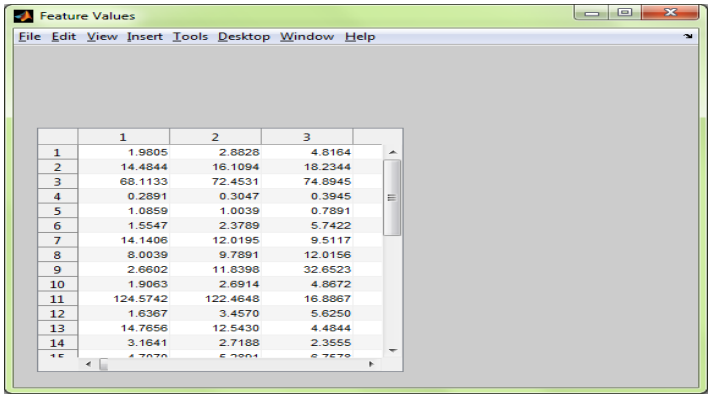

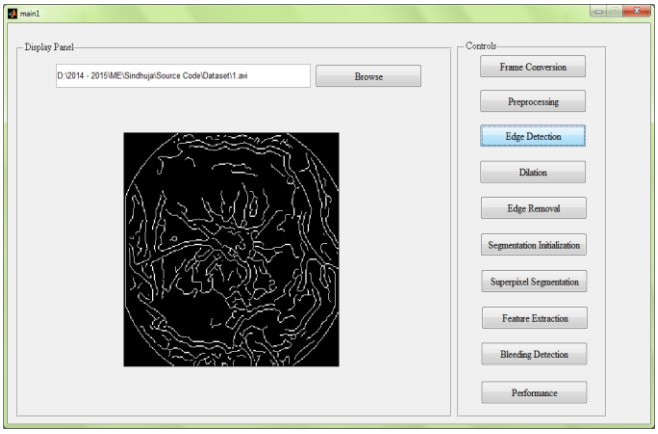

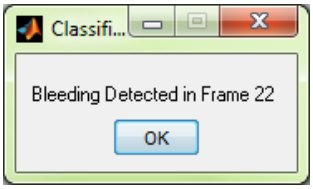

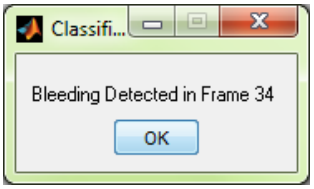

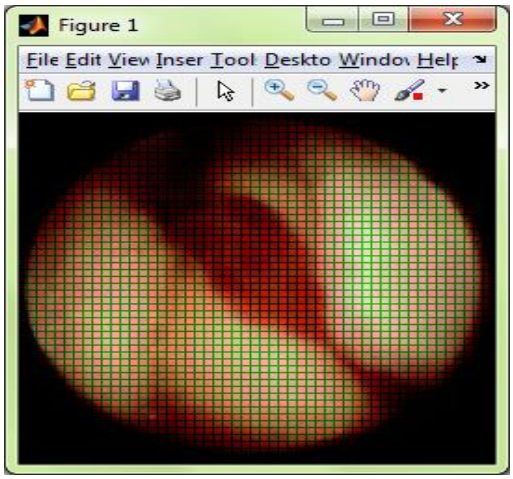

5. CONCLUSION

A method for bleeding region detection at super pixel level for WCE images were proposed. Instead of processing each pixel we group pixels adaptively based on color and location through super pixel segmentation. This Super Pixel Segmentation can balance image complexity through pixel grouping. Here introduced an initial seed growth based approach extended. This method considers pixel similarity to find clusters instead of using curve evolution. So as to achieve better and faster performance. The color similarity and the spatial similarity is measured. The obtained similarity is used for grouping the pixels into regions. The computational complexity is reduced compared to previous methods and has high performance. The performance of the process is measured by measuring the performance of the classifier. The obtained performance metrics like accuracy, sensitivity and specificity of the classifier is measured. The obtained values proves that our proposed method has high performance compared to the existing works.

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AUTHORS

R. Nandhinee, ME Scholar, R-M.E scholar, M.N.M Jain Engineering College, Chennai, India.

D. Yashwanthni, Assistant Professor, M.N.M Jain Engineering College, Chennai, India.