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Performance of Video Streaming Based on Canny Edge Detection Algorithm

M.Tech. Scholar Nikhil Soni, Prof. Mahesh Prasad Parsai
Dept. of Communication System
Jabalpur Engineering College, M.P. India
nikhilsoni8815@gmail.com, mpp_parsai@rediffmail.com

Abstract – In image processing and computer vision, figuring out where the edges are is important. object recognition is used in computer vision to give more accurate information about an image's contents as well as to improve the security and reliability of the image as a whole. There are likely to be many people who use face and pedestrian detection. In this study, we point out some problems with the traditional way of figuring out where the edges are. The goal of this work was to improve edge detection by filtering and setting thresholds for different contrasts in a picture. This study shows how to get moving and strong edges with an improved canny edge detection method. In order to cut down on the amount of data that needs to be processed while still keeping the important structural parts of an image, the main features can be found at the edges. With edge detection and morphological image processing, this study comes up with a new way to process images based on footage from a video. An inflammatory area can be found with a new way to get processed images. It will be more efficient and easy with the help of clever edge detection, so it will. Our findings suggest that we are very good at what we do. 98 percent of the time, 97.618 percent of the time. More than 90% of the 86 microseconds have passed. A person walks at a speed of 2.12 seconds per minute.

Keywords- edge detection, Image restoration, Canny Edge, Image resolution,Contour, Gaussian filter.

I. INTRODUCTION

Edge detection is an important part of digital image processing because it not only reduces the amount of data but also keeps important structural information [9]. In the beginning, a comparison of the different edge detection operators was done to find the most accurate real edges. Using visual perception and graphic analysis of the brightness of pixels, I found that the Canny edge detection method is the best way to find the edges of things.

This thesis work is broken down into three parts: the first part is about finding edges, the second part is about tracking motion with background subtraction, and the third part is about figuring out how fast things move by combining the ideas from phase I and phase II. All of these steps are done with Matlab2012, which is great for image processing applications.

As opposed to Sobel, Roberts, and Prewitt, the clever edge detection method found the most real edges in the first phase of the experiment. There are a lot of important applications that start with being able to detect moving objects. These include real-time surveillance and visual tracking. In the past, I have tried to build a way to track the movement of a moving vehicle and figure out how fast it is going.

II. EDGE DETECTION

Edges are places where the intensity of an image changes a lot. Edges are often found where two parts of an image meet. The goal of edge detection is to make something that looks like a line drawing of an image. In practise, we will look for places in the picture where the intensity changes quickly. [2] Notice that, in general, the boundaries of objects tend to make the visual intensity change quickly. Different objects are often different colours or hues, and this makes the picture intensity change as we move from one object to the next [4]. In addition, different parts of an object get different amounts of light, which again causes changes in intensity.

Fig. 1 Edge Detection.

III. RELATED WORK

Xiaojing Liu Even if there are holes in the edges of the targets, the final binary image will be mostly devoid of edges, making it hard to get a complete picture of the target through morphological processing with the traditional three-frame difference method. As a result of this research, an adaptive method for extracting target edges has been proposed. This method is used as a supplement to the detection results of the three frames difference algorithm, and then the whole moving target is found through morphological processing. This method changes the model parameters based on the movement characteristics of the target, which could improve the accuracy and integrity of edge extraction. Experimental evidence shows that the proposed method can quickly and accurately find moving objects in video sequences.[5]

Edge-Based Approaches- What ever the colour or intensity, style, or direction of the text is, edges are always a good way to tell what the text is. Text that is hidden in photos has three different characteristics that can be used to find it: edge strength, density, and orientation variation. Edge-based text extraction is a general-purpose method that can quickly and efficiently find and extract text from both documents and photos of both inside and outside. Text often has complicated shapes and a lot of contrast with the background. This is called "high contrast." The algorithms in this group do this by looking for edges in the image. Alignment, size, and orientation properties of the edges are used to separate text from other "edge" parts of an image. Edge detection is the process of figuring out where pixel intensity changes.[6] The edge detection has been used for things like object recognition, tracking, segmentation, and more. Video image edge detection algorithms use edge detection as part of their analysis of image processing and video processing, so this means that different algorithms use edge detection as part of their analysis. [7]

Problem Constraint

Basically, edge detection can be broken down into spatial and frequency domains. People who work with images in the spatial domain do things like add or remove pixels from them. This is called a "operator-based" method. This method has first-order and second-order methods that are part of it. They both work on the picture gradient, but in different ways. First-order: The first derivative of the image gradient, while second-order: The second derivative of the image gradients. Sobel, Prewitt, and Roberts are some of the first-order edge detection techniques. Laplacian and Canny are the second-order edge detection techniques. Table I talks about the problems with spatial domain methods. The Fourier Transform method can be used to convert a picture into the frequency domain, but it can't do the same thing in the spatial domain. After putting it into the frequency domain, other things could be done. Initially, a low frequency operation was used to get a sufficient amount of information, and high frequency operations were used to get the image contours that corresponded to that information. It is very difficult to search for things because of the frequency domain. The most important goal is to quickly and accurately recognise the edges of objects in the picture. Gonzalez and Woods [26] were the first people to try to figure out where the image's effective edges were in this case. Now, let's talk about the first and second-order approaches, as well as how they work.[8] The Prewitt operator is thought of as a discrete differential operator. It is used to calculate the gradient and the intensity function of an image.

This is a simple operation to do, but the results are very sensitive to the amount of noise in the picture. An operator called Sobel was added to this first-order differential method to help find edges. There was a big improvement in the gradient with the functional variation. Because of this, the image is shown as a continuous function of the grey image. In the grey image, the gradient function has caused a lot of movement as a result of this. If there is a lot of noise in an image, the Canny Edge will be affected. It is more sensitive to noise than other edges.

IV. IMPLEMENTATION OF CANNY EDGE

It makes all the video in this work. People should keep the following in mind: Images and thresholds can be chosen in any way that you want, and they can be used in any way. Only a smoothing filter that has a standard deviation is allowed to be used. Euclidean measures of the strength of the edges are used, which are said to be "accurate." The different filters can't be used on the edges of the pixels. Because of this, the image will be 8 pixels smaller in each direction. Our method, on the other hand, is a series of steps. Weak edges are first looked at for other weak edges and then grouped together. In addition, groups that are next to each other are marked by a slash. Then, all of these markers are looked at to figure out which sets of weak edges are 6 linked to strong edges (directly or indirectly) (directly or indirectly). All weak edges that are connected to strong edges are called strong edges. The flaws have been hidden by a thick layer of armour.

V. RESULT AND ANALSYIS

The proposed model's flow chart, which shows how it worksin this video, you can see how the algorithm is made. After taking still images from a video, we did some pre-processing steps that turned the RGB image into a greyscale one. So median filtering removes the

noise from the image, and the image has been binaries so that it can be used to look for edges. First, we used clever edge detection to find the edges of the photos. Then we used morphological image processing to apply the close method, erode method, and hole filling method to the edges of the photos. Finally, a window for the area you want is made.

Pre Processing- Some pictures need to be cleaned up before they can be used. This is called "pre-processing." As a result, a picture of intensity is used as both input and output in this case. [9] [10] Pre-processing means that after we apply one algorithm to an image, we run the results through another algorithm to get a better version of that image. There are some ways to do this before you take a picture. As well as, Pixel brightness,

- Image restoration,
- Image resolution
- Median Filtering

Pixel S- A: In Digital Imaging, A Pixel (Or Picture Element T) Is The Smallest Bit Of Information In An Image. Pixels Are Grouped In A 2-Dimensional Grid, Illustrated Using Squares. Each Pixel Is A Sample Of An Original Image, [11] Where More Samples Often Yield More-Accurate Approximations Of The Original

Image Re-Establishment- When An Image Is Restored, It Is Brought Back To Its Original State After It Has Been Damaged. This Usually Happens With Blurred And Noisy Images. Image Restoration Is A Very Important Topic In The Field Of Image Processing. It Serves As A Test For More General Problems In The Inverse Of Image Processing.

Image Resolution- Image Resolution Is Often Written As PPI, Which Is How Many Pixels Are Shown Per Inch Of An Image. Higher Resolutions Mean That There Are More Pixels Per Inch (PPI),[12] Which Means More Pixel Information And A High-Quality, Sharp Picture.

Median Filtering- Noise In An Image Or A Signal Can Be Reduced By Using The Median Filter, Which Is A Digital Filtering Method That Isn't Linear.[13] Pre-Processing, Like Reducing Noise, Is Common In Order To Improve The Results Of The Next Steps.

In The Process (For Example, Edge Detection On An Image). Others look at the pixel's immediate surroundings when they process it. Mage pre-processing is meant to fix some of the problems with the image, such as correcting the brightness because there was not enough light where the image was taken, or improving the quality if the device didn't have the ability to do so.

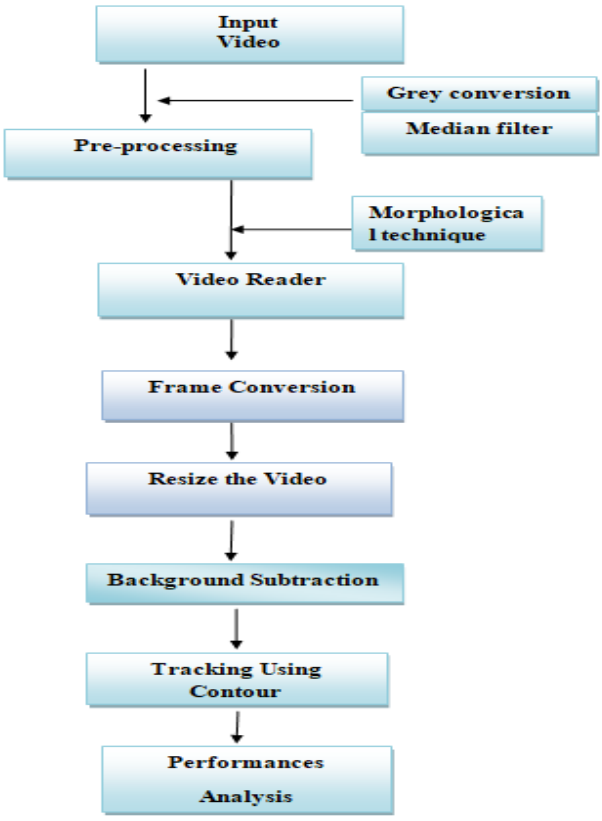

Fig.2 Proposed flow Diagram.

For this, you need to know about the acquisition equipment.[14] RGB to greyscale, median filtering, and image linearization are some of the picture processing techniques that have been used in our suggestion so far. Image pre-processing methods take advantage of the large amount of redundancy in an image.

Step1: Read Video Sequences by using Video Reader Object.

Step2: Capture two images and store it in IMG and IMG1.

Step3: IMG: = Convert Frame number N to Gray Scale.

Step4: IMG1: = Convert Frame number N + 1 to Gray Scale.

Step5: Subtract frame IMG from frame IMG1, to generate the
Difference image.

Step6: Applying CROP function to Select the particular areaof an image and store it into a variable (say Crop).

Step7: Run canny filtering on the Crop image in order to remove noise and to detect the edge.

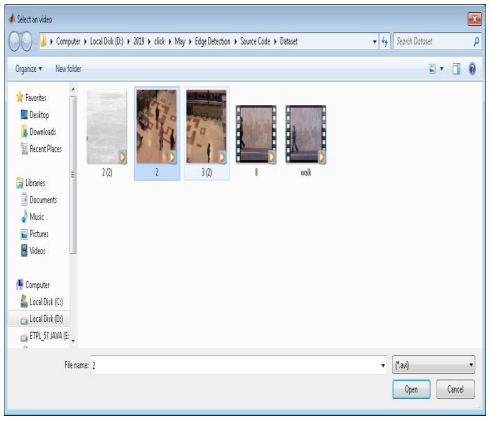

Fig .3 video data set.

Fig .4. Original video data set.

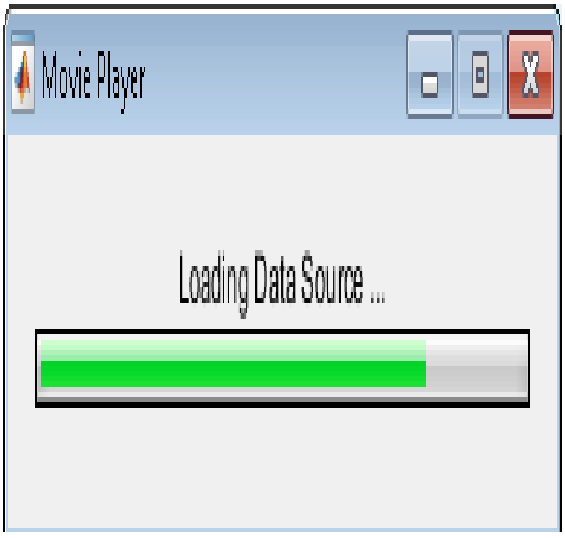

Fig .5 loading video data set.

When the lighting changes, TV cameras and other high-definition video cameras use an automatic method to make sure they can work. Because laparoscopic video capture cameras are inside the body, they don't have the ability to process the images they produce before they can be used.

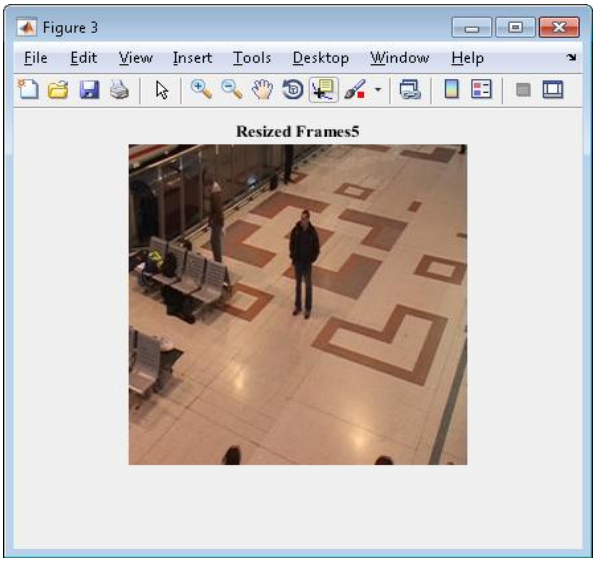

Fig. 6 input video (b) Gray image (25th frame).

We then make the image less clear after dilation. Perform vector subtraction of the items you want to remove when you are eroding them. After a region is eroded, subtracting its value from its neighbour's value makes the edge smaller. This gives us a better picture of the area we're working in. Then, after the second time we eroded, we got the photos below. Then, we turned the images into RGB images.

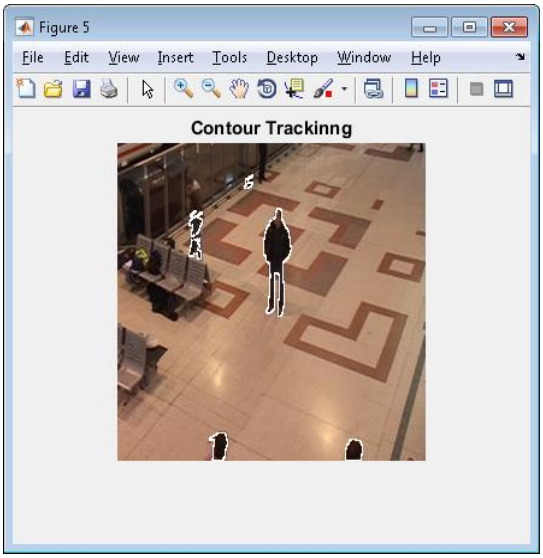

Fig 7 Edge extractions.

People talk about "binarization" when they change an image made up of pixels into a binary image. In the beginning, it is what makes it possible to break things up. When the Laparoscopic film is turned into greyscale, a threshold is set. There can be a fixed threshold, or it can be based on how the clustering algorithm works. A bad choice of threshold value can make the background pixel

look like an object and the object look like a background pixel, resulting in a decrease in overall surgical performance. People use binarization to make it easier to find what they're looking for. In this case, it's the appendicitis that is inflamed.[15] In the area of the abdomen where the surgery will be done, there will be a lot of different layers and things that will be there. We had to be able to tell the appendicitis from them. Getting to know its depth and where it is.

Table1.PSNR Result Comparison

	PSNR
Proposed Work	18.87
Existing Work	3.84

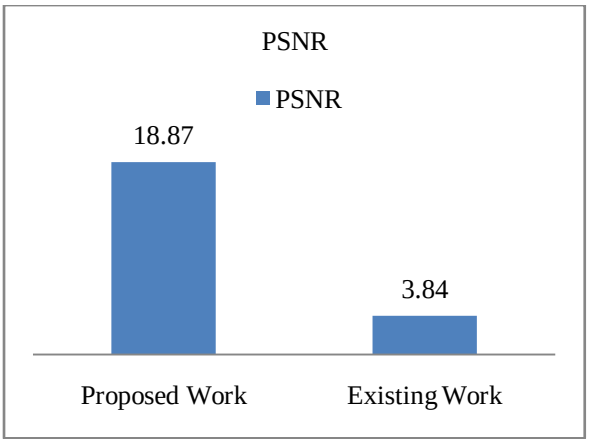

Fig. 8 PSNR Result Comparison.

Table 2. MSE Result Comparison

	MSE
Proposed Work	77.20
Existing Work	26825

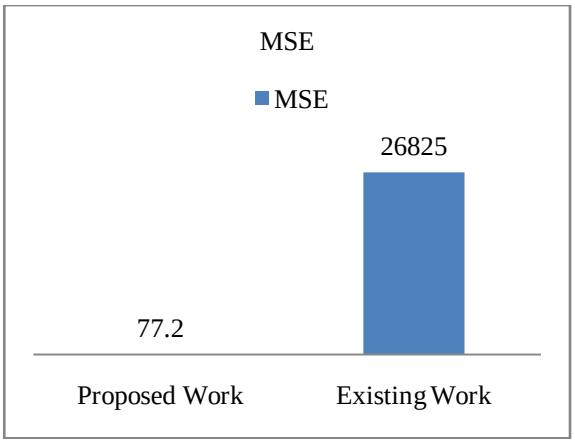

Fig. 8 MSE Result Comparison

Table 3.Accuracy Comparison

	Accuracy	Specificity	Sensitivity
Proposed Work	97.61%	98%	98%

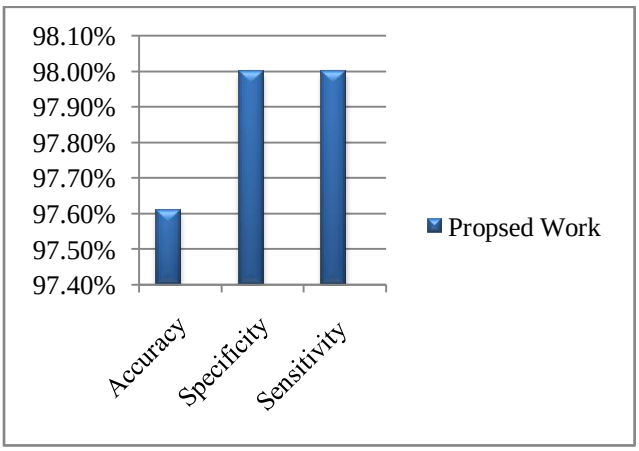

Fig.9 Accuracy Comparison

VI. CONCLUSIONS

In the conclusion, This paper is made up of three parts: the first part is about figuring out where the edges are, the second part is about tracking motion with the help of background subtraction, and the third part is about figuring out how fast the object is moving by combining the ideas from phase I and phase II. All of these things are done with Matlab2019, which is best for image processing. It was found that canny edge detection found the most real edges when different edge detection operators were used on the same source image. There are a lot of important applications that need to be able to tell when things move, like real-time surveillance and visual tracking. I have tried to add motion tracking and speed detection to a moving car.

My project had a lot of issues that came up while I worked on it. Is an object that moves slowly a background? If so, based on the speed of moving objects, when should we think of these as backgrounds? It's important to figure out what the speed should be at the very least. Random noise or sudden changes in lighting can make it hard to see moving objects. This is because it could mess with the background model that was used to make the model. To figure out how the background looks, directly calculate the difference between two Convert to Gray Scale images. Image Images from the video source can be taken with this tool Frame N (Color) Frame N + 1 (Colour) (Colour) When you remove colour from an image, it looks like this Using the Canny Edge Detection Repeated image frames are used to look for moving objects based on the differences in the two. Camera placement is also important when taking

pictures. In my opinion, the best way to get a good picture of an object is to keep the object in the middle of the picture. Another important part of the moving object detection is where the object is in the picture. We can say that a moving object that is closer to the viewer is moving at a faster rate than one that is far away.Final result compare with existing paper which is showing higher accuracy and PSNR and MSE also showing in improvement as per existing paper.

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