Surveillance System for Animal Detection in Image Processing Using Combined GMM, Template Matching and Optical Flow Method

Rumel M S Pir
Assistant Professor
Leading University, Sylhet Bangladesh

***Abstract* - Using Surveillance systems we get video level processing techniques so that we can recognize the items or objects from any video file. So much of the developed countries and also some developing countries are making use of farm surveillance system so that they can analyze the farm from any place of the world. In this topic we are captivating some videos from farm surveillance system and on the basis of that we perceive animals and as the camera identify animal, alarm rings. It can be very useful to protect the farm from crop exposure by animals. In this topic there is a concise examination of diverse object recognition techniques and also many background subtraction techniques like Kalman filter, frame differencing, Optical Flow method , mixture of Gaussian model, and Combination of GMM and Optical flow methods. Further to identify object as animal there are some special techniques like contour based technique, template matching, edge based technique ,skeleton extraction, etc. But after survey of diverse methods and by combining preeminent attribute of them, the system is projected for animal detection. We use normalized cross correlation method for template matching so that we can identify an item or object as animal. Planned organization uses the Combination of all three GMM, Template Matching and Optical flow method for background subtraction.**

***Index Terms* - Template Matching, Surveillance, GMM, Optical Flow, Image Processing, Detection**

I. INTRODUCTION

Surveillance systems are extensively we can use these days for a vast amount of applications. Security surveillance structure together with CCTV is useful due to raise of terrors as well as crimes. Surveillance systems can also be used in many spaces to examine unsuitable actions. Subsequent are the spaces where surveillance systems are useful:

1. Patrolling national boundaries.
2. Patrolling of highways and railways for disaster recognition.
3. Monitoring of banks, airports, stations, museums, and private properties and parking plenty for offense avoidance and recognition.
4. Detecting people, their actions, and related actions such as in excess of staying.
5. Measuring velocity of vehicles.

Definition

The classification for the development is "Surveillance method to detect the Animals". The major objective of the planned definition is to build up an example consisting of two cameras, positioned in reverse direction, having dissimilar/overlapping FOV meant for existent time recognition and tracking the movement of animal and produce an alarm without human intervention as soon as it enters any barred area.

Description

Video-based observation started through analog CCTV systems with the intention to support black and white feeds from distant cameras associated to a vital monitoring location. Human beings were completely responsible for the dispensation of image information streaming in from frequently several sources. Although there has been huge development in these systems, there still residue the whole reliance on human being operators. 3rd generation observation systems (3GSS, 2000-) offer end-to-end digital systems. Image attainment and dispensation at the antenna level, announcement through portable and fixed heterogeneous broadband networks and image luggage section at the inner server's advantage from low cost digital transportation. The crucial goal of 3GSS is to permit video information to be used for online alarm generation to assist human operators and for offline inspection effectively. To attain this goal, 3GSS will offer smart systems that are intelligent to produce real-time alarms distinct on compound events and switch disseminated luggage compartment and content-based recovery of video information. Observation Systems' requires fast, healthy and dependable algorithms for object discovery and tracking. The planned description aims to attain the performance of the elegant observation system to sense and track the movement of a creature in a banned area and robotically produce an alarm which will facilitate the human being operators to obtain action rapidly.

Scope of Work

- Cameras would be motionless.

- Track of movement of creature can be detected.
- Scheme would generate results for videos occupied through day time.
- There cannot be supplementary than 4 cameras.

Need for the System

On state highways, the vehicles travel at extremely high velocity. The limitations of these highways are extremely low payable to which there is a likelihood of nature passage the border line and future on the highway. This may end result in major disaster. In such a situation the planned structure would be cooperative as it can sense the unnecessary object and produce an alarm as soon as it enters the region. Also in a vast university grounds like a university campus, housing area, office structure or any other site this structure will be helpful.

II. COMPONENTS OF VIDEO SURVEILLANCE SYSTEM

Next Figure displays the working of VSS.

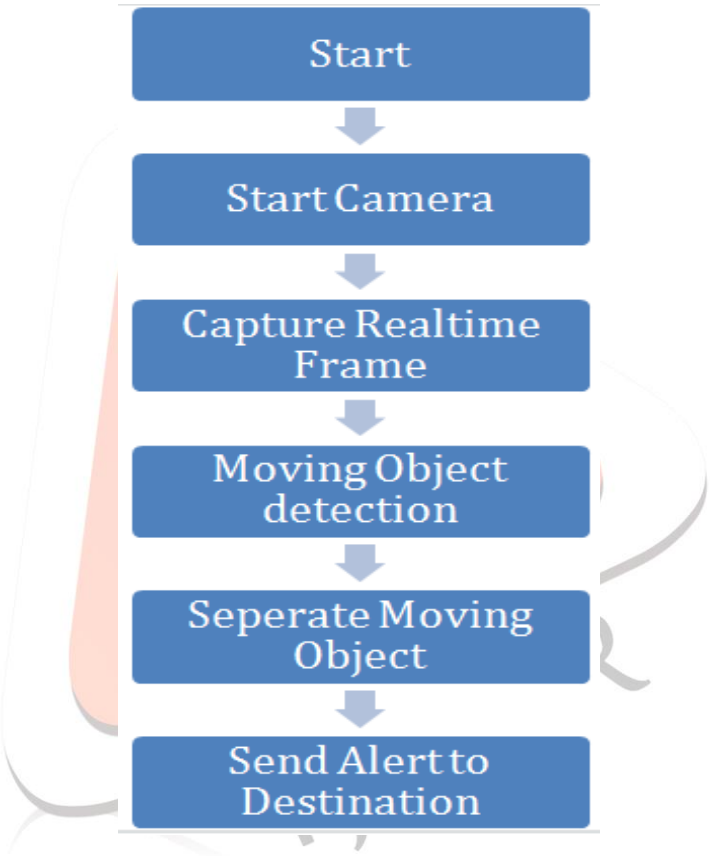


Figure 1: Working of VSS

In VSS, there are six mechanisms. These mechanisms are listed under.

A. **Acquisition -** This module is fundamentally used to acquire the images. There is a absolute array of camera models so that we can assemble different review requirements. They are analogue and digital, and can be power-operated or not. Planetary cameras can as well be used in a lot of application.

B. **Transmission -** The video captured by examination cameras have to be sent to the video recording, dispensation and presentation systems. We can do this broadcast by cable (thread optic or coaxial cables or copper wire) or by space (infrared signals).

C. **Compression -** Digitized video represent an enormous quantity of data to be transmitted and archived. So that, we have to squeeze observation video by means of codec, algorithms to decrease the quantity of information by deleting replication, by image or sandwiched between video recording frames, as well as particulars that cannot be seen by a human being eye.

D. **Processing -** Video administration systems procedure video surveillance images, such as organization dissimilar video flow, and showing, video recording, analyze and searching recorded footage. There are three major types of video management systems, Digital Video Recorder (DVR), Hybrid Digital Video Recorder (HDVR), and Network Video Recorder (NVR).

E. **Archiving -** The video recording archiving time varies depending on surveillance needs, ranging from little existence to few years. There are two types of archiving policy, interior and emotionally involved.

F. **Display -** Video observation can be viewed on dissimilar devices. In little amenities, the video can be view directly on the recorder, as the image is to be recorded. Images are usually viewed vaguely on computer or on a movable device such as a handset.

III. PROPOSED SYSTEM

In the proposed system, it first fetches the current image from the stored video, then by using the background subtraction methods; the common background of farm trees are subtracted. Then from that image the object, for our purpose the animal can be detected and then animal tracking is taking place and at last alarm will be generated so that crops can be saved.

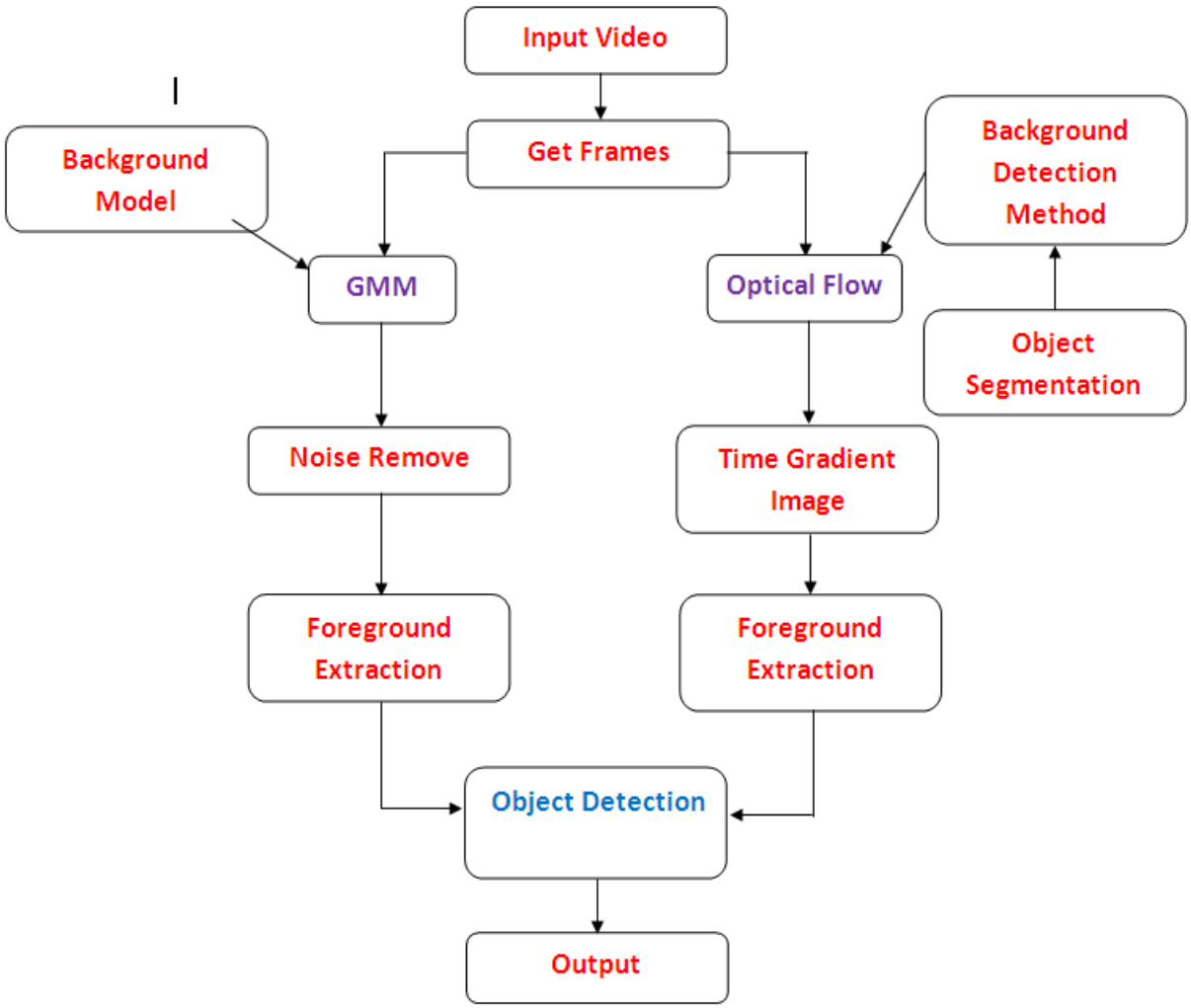
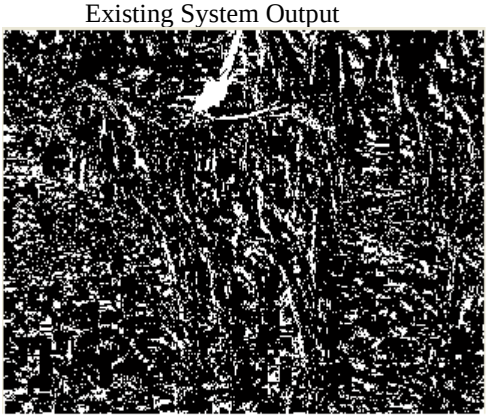


Figure 2: Block Diagram of proposed system

IV. IMPLEMENTATION

(I) 1st Video

Existing System Output



Proposed System Output

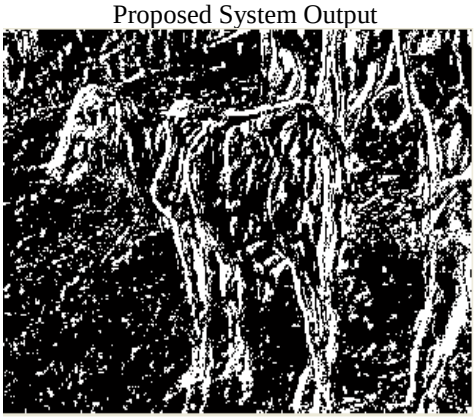
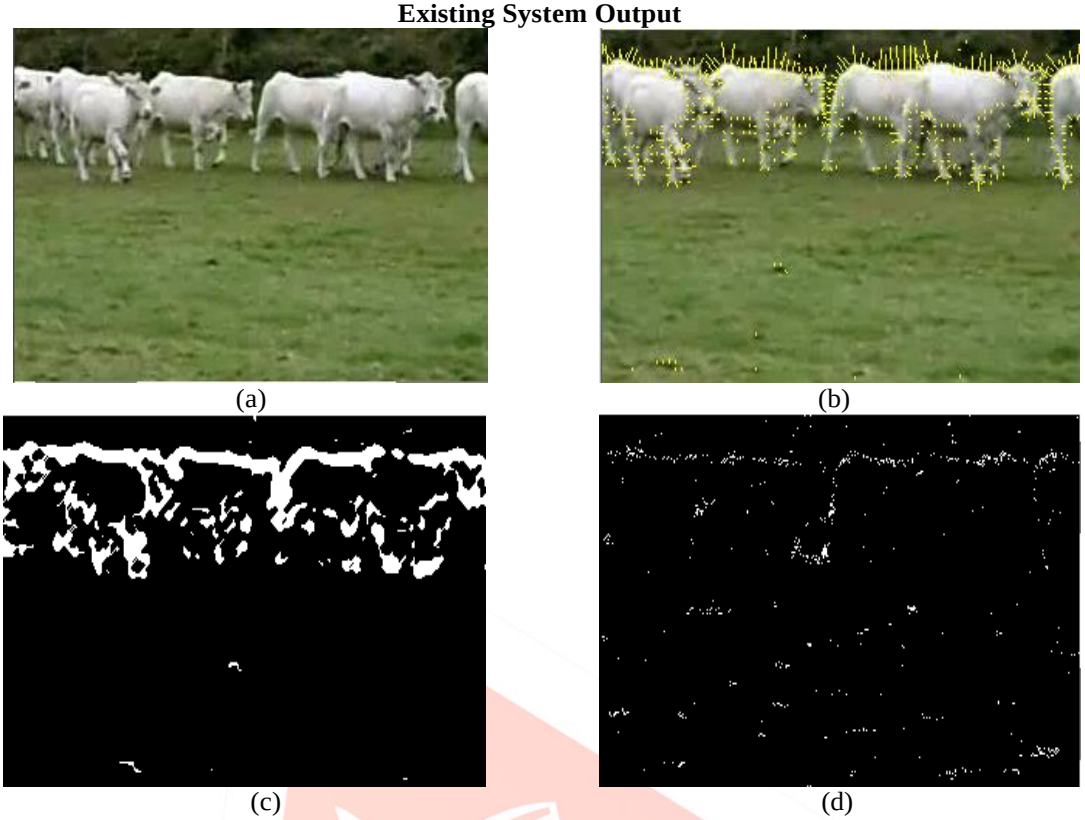


Figure 3: Comparison of output for existing and proposed system

(II) 2nd Video

Existing System Output

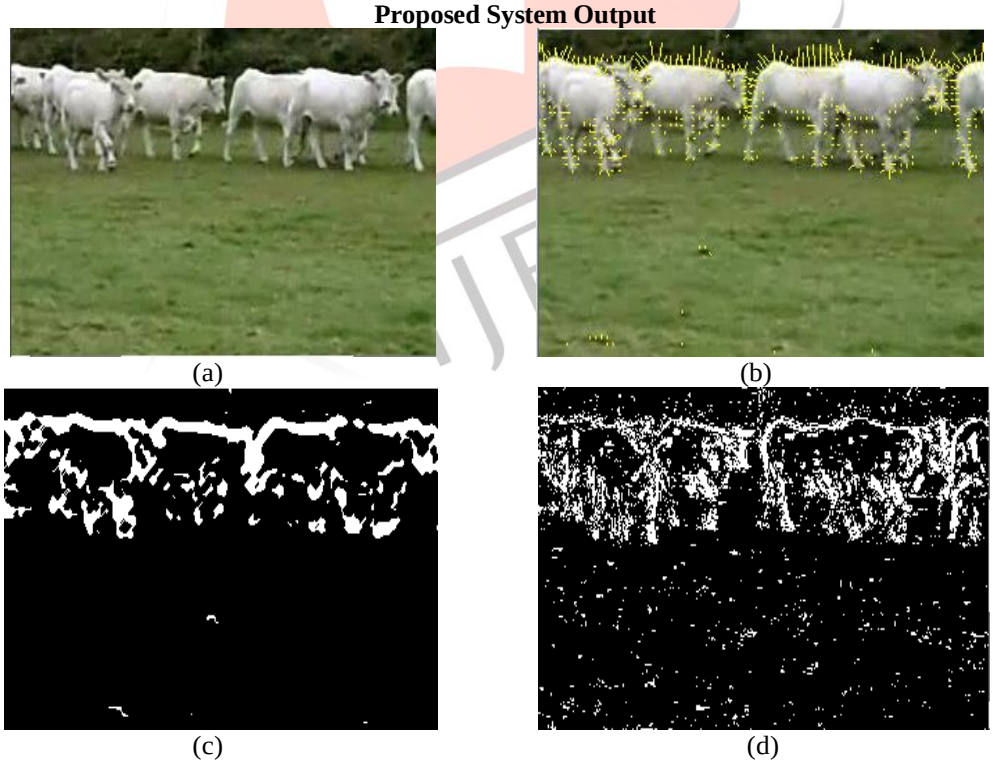


(a) (b)

(c) (d)

Figure 4: Comparison of output for existing and proposed system (a) Original Video (b) Motion Vector (c) Threshold (d) Results

Proposed System Output



(a) (b)

(c) (d)

Figure 5: Comparison of output for existing and proposed system (a) Original Video (b) Motion Vector (c) Threshold (d) Results

(III) 3rd Video

Existing System Output **Proposed System Output**

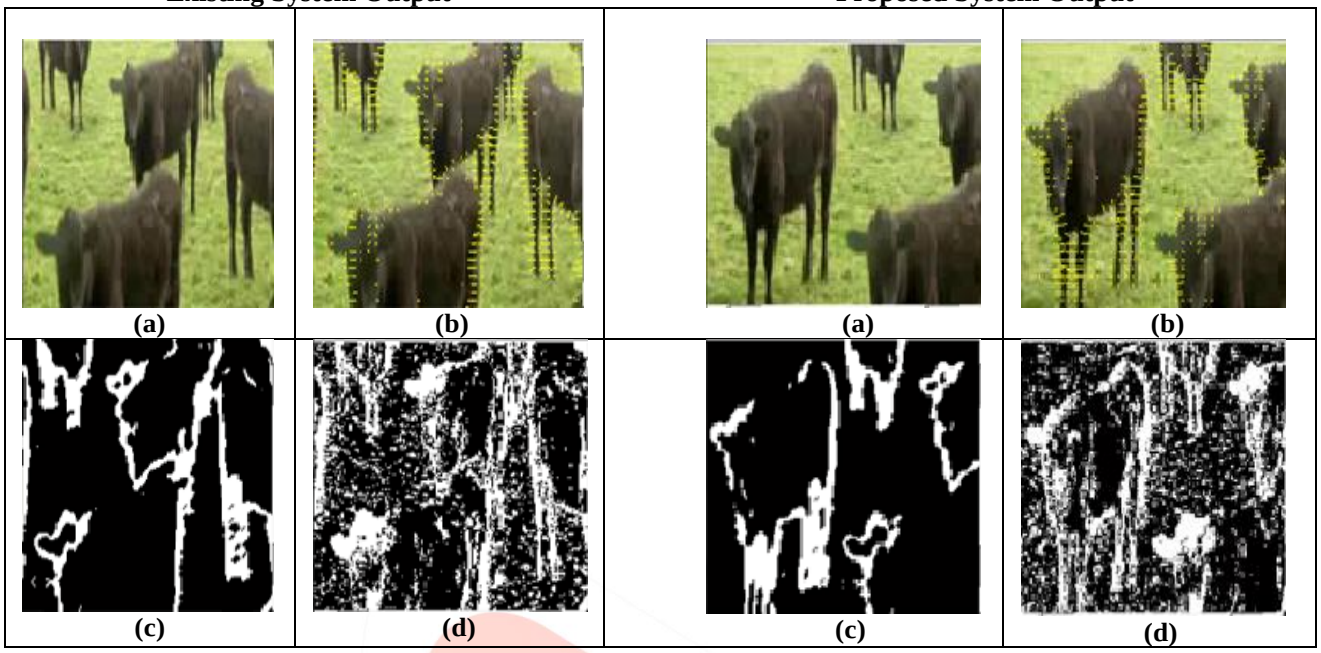


Figure 6: Comparison of output for existing and proposed system (a) Original Video (b) Motion Vector (c) Threshold (d) Results

V. RESULT ANALYSIS

Table 1: Comparison of Proposed structure frames with Main frame

Frame	Mean Square Error	Peak Signal to Noise Ratio	Average Difference
11	1.7711e+04	4.6507	78.4109
15	1.8437e+04	4.4692	24.7512
21	1.8380e+04	4.4638	63.7007
22	1.8613e+04	4.4560	111.0697
28	1.8110e+04	4.4803	85.0364
30	1.8024e+04	4.5698	47.2410
32	1.8722e+04	3.6457	45.9469
37	1.8157e+04	3.5537	57.3417
38	1.8281e+04	4.4338	102.7005
41	1.8517e+04	4.5460	84.0696

Table 2: Comparison of Existing structure frames with Main frame

Frame	Mean Square Error	Peak Signal to Noise Ratio	Average Difference
11	1.8860e+04	5.3754	120.2972
15	1.8431e+04	5.4751	121.2331
21	1.8582e+04	5.4402	122.7332
22	1.8752e+04	5.3358	122.3173
28	1.8238e+04	5.1758	122.6330
30	1.8351e+04	5.5478	126.7138
32	1.8572e+04	5.4301	122.7332
37	1.7713e+04	5.3652	122.3173
38	1.7631e+04	5.3728	122.6330
41	1.8456e+04	5.2448	126.7138

Table 3: Comparison of Proposed structure frames with existing structure frame

Frame	Mean Square Error	Peak Signal to Noise Ratio	Average Difference
11	1.8216e+04	5.5263	31.8862
15	5.7846e+03	10.5081	21.3404
21	6.6683e+03	9.8906	19.8842
22	6.8850e+03	9.7518	16.4168
28	2.1424e+04	4.8218	44.4921
30	6.2846e+03	5.5082	17.3408
32	6.2583e+03	7.6900	20.8241
37	6.8451e+03	7.7518	18.2148

38	3.3424e+04	7.8213	33.2921
41	7.5681e+03	8.3905	19.8842

VI. CONCLUSION

From all the information and tables we can see the dissimilarity between Existing and Proposed structure Outputs. We can note the results of our proposed structure are better than in existing structure. If we evaluate two results then in a straight line visually we can tell that productivity is constructive here so our proposed work is growing the quality of an algorithm. Also if we compare table 1 and table 2 then we can see that Average Difference is less in table 1 that is for proposed structure. Also from table 3 we can check that average difference is not as much of so it increases the excellence in proposed structure.

VII. FUTURE ENHANCEMENT

Currently we are functioning on stored video but it is also probable to apply it on exist video. We can add it to a neural system so that we can make a decision whether detected entity is animal or not.

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