Recognition of Human Action Under View Change

First Review Presentation

Under the Guidance of
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Submitted By

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Introduction

The Application of the project title "Recognition of Human Action Under View Change " is directly used in automation of surveillance camera operation where normally a human controller used to continuously monitor video footage.

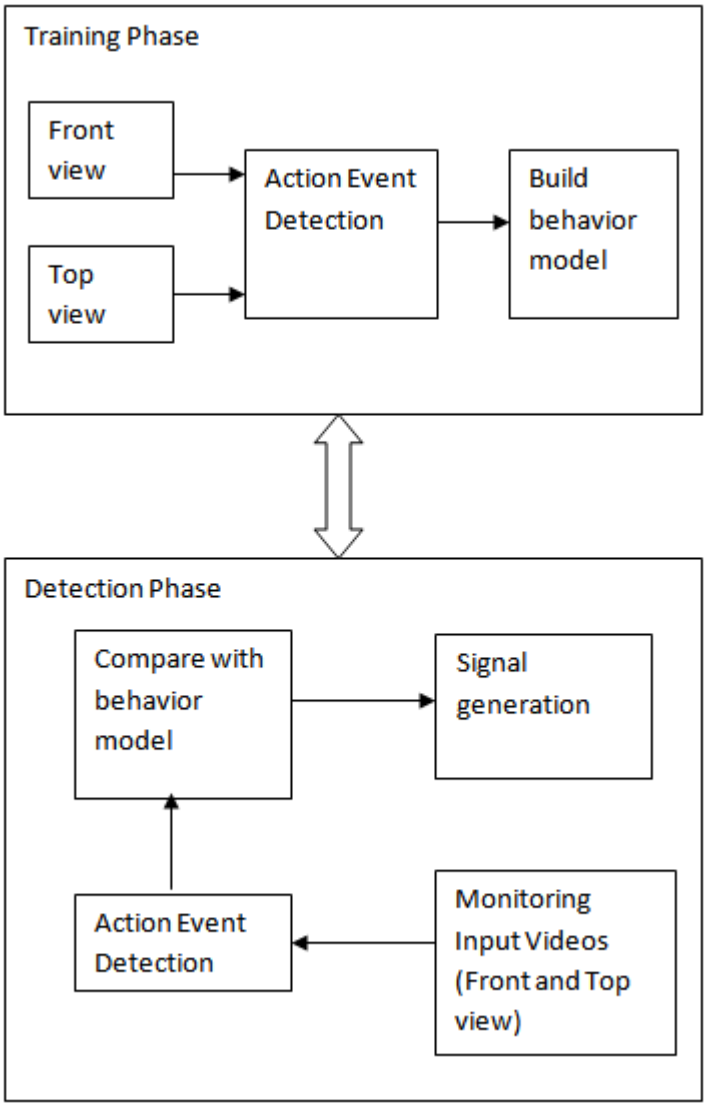
Essential scope of the proposed software

- Full Automation of Monotonous Surveillance operation.
- Reduces the Human Requirements
- Enhanced accuracy and precision in monitoring.
- Provides more security.
- The system can be easily modified to suit current requirements.

Training Phase

- This training module would initially train the system with new input Behavior of various Authenticated people
- After this step the new activity has been recorded into the System and next time when the system detects the same activity by the user there will be no mismatch with the system entry and it will ascertained as valid person.
- Training is crucial Phase for the success of the automation of surveillance camera as result of this phase determines security.
- objective of this phase is to recognize and differentiate between the authenticated valid

Basic Architecture of System



First Review Implementation

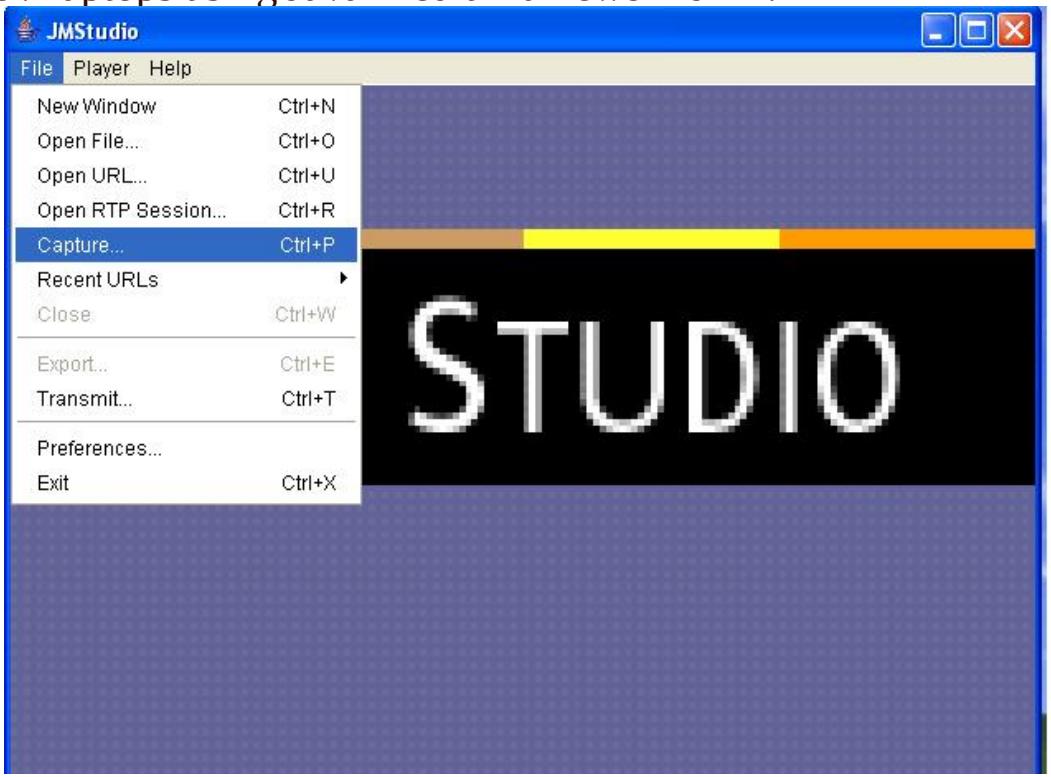
List of the modules in the proposed system that are partially implemented for the first review are namely

- Video Recording
- Video Analysis
- Segmentation of Video
- Extract BLOB images
- Storing Preliminary blob image information
- Training Phase implementation

First Review Implementation

VIDEO RECORDING

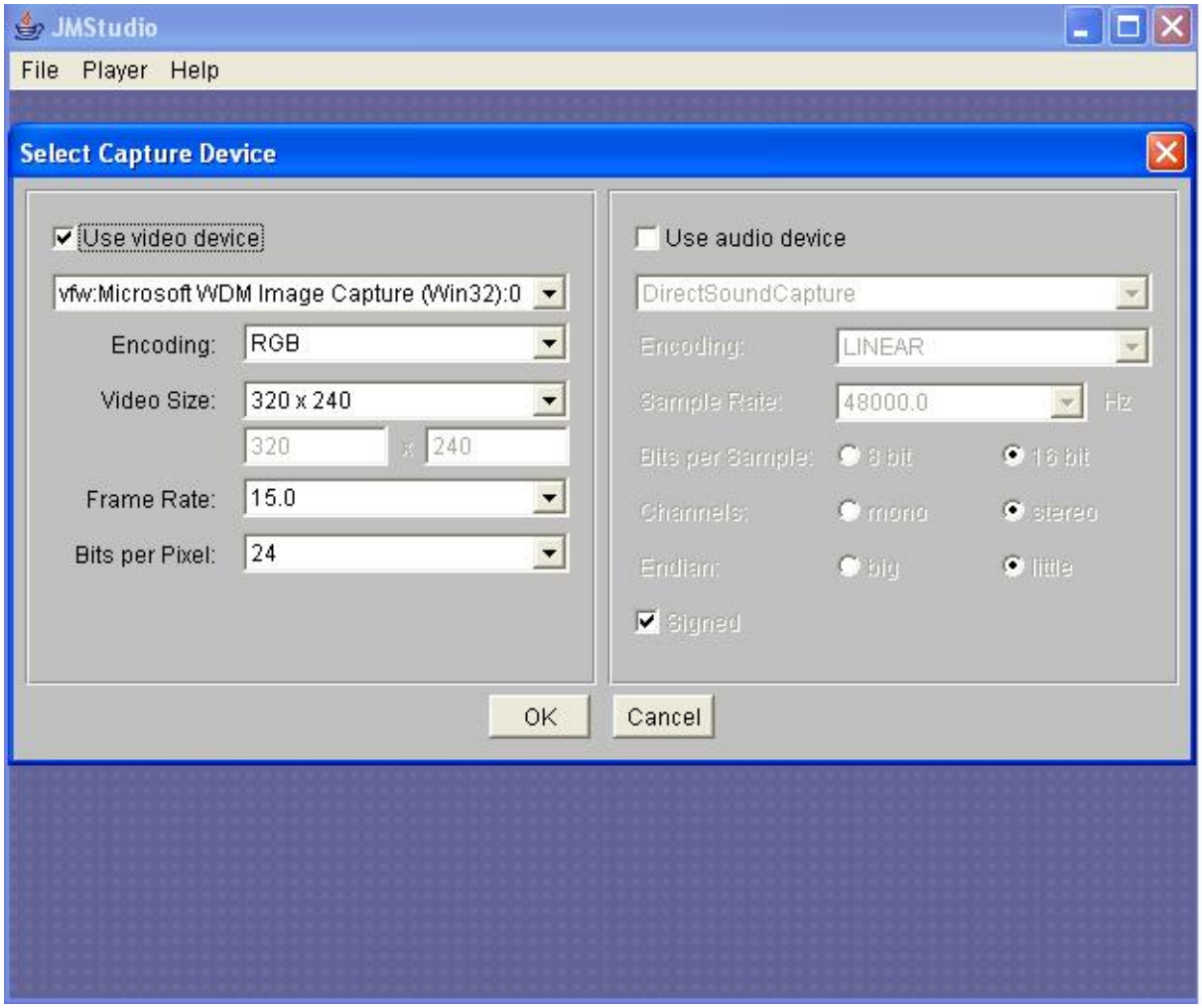
- First job in the proposed system is recording video footage involving humans in a specified and compatible video format and encoding type namely .avi format.
- Video Recording might be captured using any simple web-camera integrated with Computer/Laptops using Java Media framework JMF.



VIDEO ANALYZER

- The input AVI video file that is captured using JMF used as input for this module and eventually splited into sequence of into JPEG images frames
- Every Image Stored with an unique name comprising the timestamp of that particular image
- Various parameters that can beset by the user are
- Encoding format-RGB Format used here.
- Video size 320x240 resolution.
- Frame rate 15 fps.(Frames per Second)

Video Analyzer module using JMF snapshots



Algorithms

SSM-Self Similarity Matrix

In a sequence of images $T = (T1, T2, ...Tk)$ in discrete (x; y; t)-space, a SSM of τ is a square symmetric matrix of size

$$T \times T,$$

$$[d_{ij}]_{i,j=1,2,\ldots,T} = \begin{bmatrix} 0 & d_{12} & d_{13} & \cdots & d_{1T} \\ d_{21} & 0 & d_{23} & \cdots & d_{2T} \\ \vdots & \vdots & \vdots & & \vdots \\ d_{T1} & d_{T2} & d_{T3} & \cdots & 0 \end{bmatrix}$$

is the distance between certain low-level features extracted in frames T1 and Tk respectively. The diagonal corresponds to comparing a frame to itself (no dissimilarity), hence is composed of zeros. The exact structures or the patterns of this matrix depend on the features and the distance measure used for computing the entries d ij.In a video sequence, compute a particular instance of SSM where d is the absolute correlation between two frames, as depicted in The computed matrix patterns have a significant meaning for their application the diagonals in the matrix indicate periodicity of the motion. d ij is Euclidean distance between the different features that is extracted from an action sequence. This form of SSM is known in as Euclidean Distance Matrix

Behavior Pattern Analysis

1.Identify the foreground and background pixel of a frame.
2.Background model stores the values of a particular pixel which corresponds to background colors.
3.Pixel change history(PCH) is represented for a pixel. Similar foreground pixels are grouped to form a blob.
4.A behavior pattern is represented as a sequence of various events.

Behavior Pattern Formation

While generating Blob Images we keep track of the previous image and the current image difference in intensity namely R,G,B variations for behavior pattern formation that will be useful during Detection Phase.

VIDEO SEGMENTATION

- Video Segmentation involves spitting the input video from the surveillance camera into various sequence of frames with help of Java Media Framework.
- Video can be simply sliced into overlapping segments with a fixed time duration.
- Video Segmentation involves Automatic segmentation of continuous video sequence ‘V’ into ‘N’ segments.
- V={v1,v2,v3,. . . . . vn,. . . . . vN} each segment contains a single behavior pattern.
- A video segment Vn consists of Tn image frames. Vn=[In1,In2,In3. . . .InTn]

VIDEO SEGMENTATION

Various steps involved in Segmentation of video into corresponding jpeg images

- Append the "file:" before the path for split as frames
- Check whether the file is supported extension
- Get background image from backgroundcapturing class
- Get the array pixel using getpixel method for given image as argument
- Get the background image width, height
- Create the frame formation object for given video url
- Get the each frame using frameformation object using the following method hasNext(),nextFrame()
- Get the pixel array for the tmpimage

*java code used here

CONVERTING INTO BLOB IMAGES

- Blob images are those which comprises of subject of interest without any background pixels and this case our subject will be human being under surveillance.

- Blob image occur within the span of splited image and height and width will be known from the splited image.

- As Front and Top Views are both in parallel execution with the java threads both blob images are obtained and stored simultaneously.

```
int imgheight = end.y-start.y+1;
int imgwidth = end.x-start.x+1;
```

Blob Image Representation

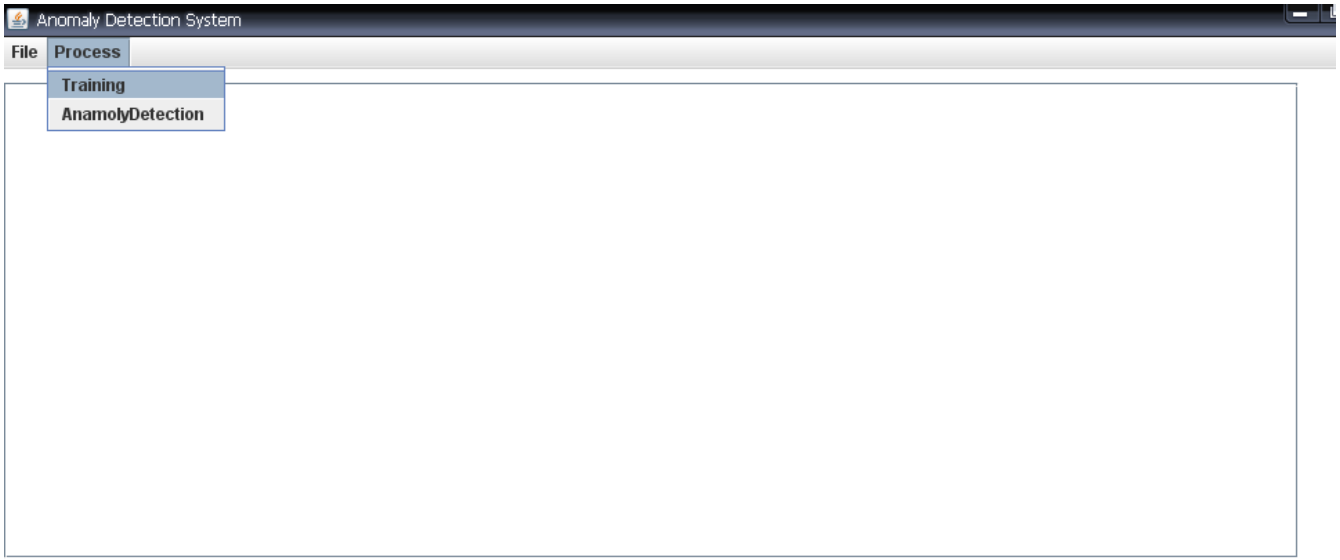
Once the Blob image are generated for both front and top view simultaneously using Threads both blob images are stored in file system and the data information .

- Current RGB values
- Previous RGB Values
- Frame No
- White, black color intensity difference
- splited image dimension,
- Blob dimensions in x,y coordinate system
- Different Pixels in blob area.

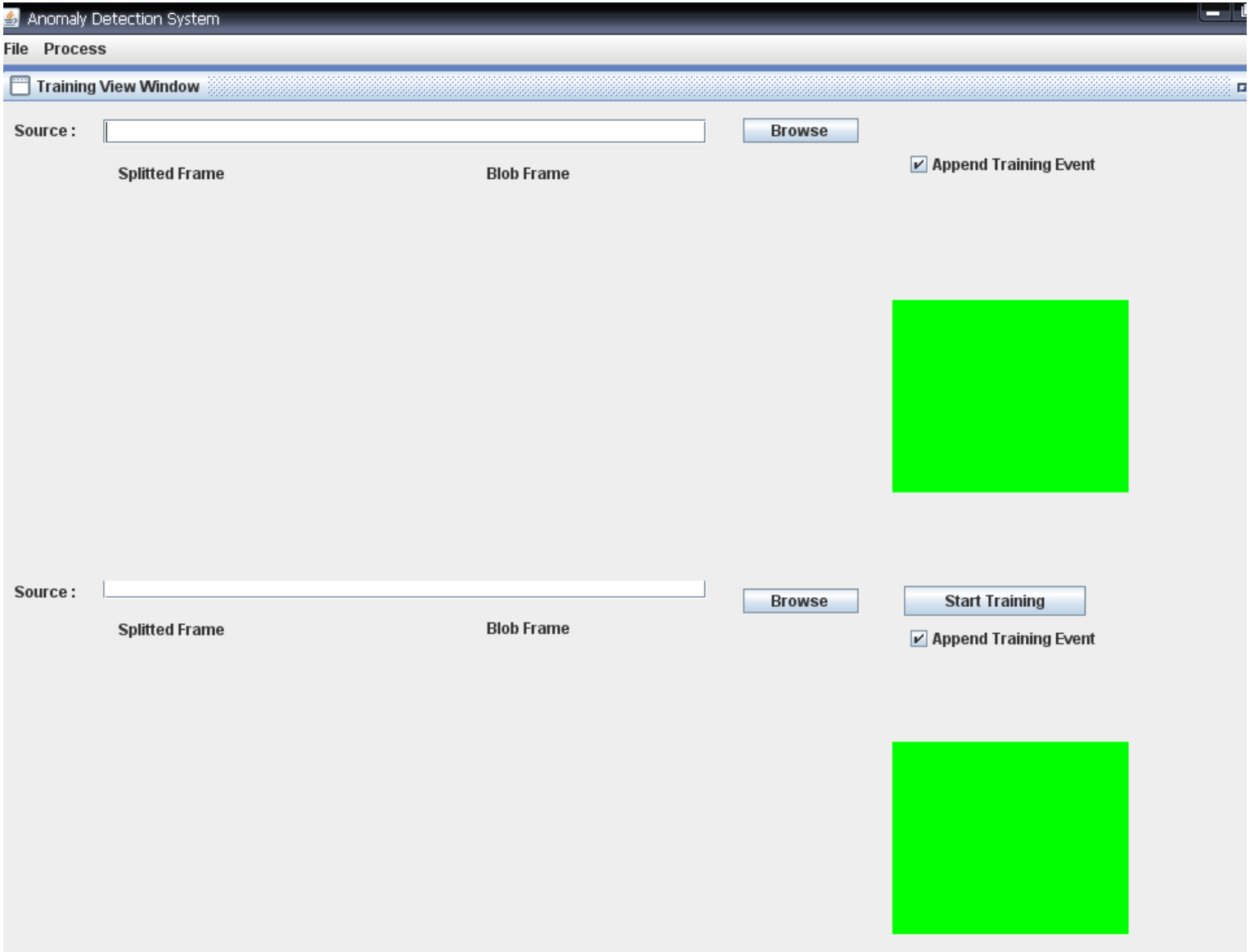
- These information are displayed in runtime environment to the admin during training phase
- The End of Training Phase all the authenticated behavior pattern will be stored in the file system and behavior pattern is formed which acts as a source for validation of human activities during Detection Phase.

Blob Image formation

Training phase Implementation snapshots



Training phase Implementation snapshots (cont)



Implementation snapshots (cont)