MOTION DETECTION USING HISTOGRAM OPTICAL FLOW FOR HUMAN ACCESS CONTROL POINTS

Pappu Venu, Narra Dhanalakshmi, and G.Radha Krishna.
Department of Electronics and Communication Engineering, VNR Vignana Jyothi Institute of Engineering and Technology, Vigana Jyothi Nagar, Opp.JNTU, Bachupally Road, Nizampet (S.O), Hyderabad, Telangana 500090.

ABSTRACT

Human movement and his identity of appearance are the primary for security access in many companies and scrutiny in and out checkouts for monitoring the employee status. we are representing a security system that checks the action of a person and verify his presence accurately and gives the report status. It also imparts server access limits for verifying identity to avoid intruder and providing an access point to unlock the server for a considered time interval. Our aim of the project is to verify person's identity using only motion features and create the sub-camera monitor system used for future 360° cameras. This approach uses the train of image frames in actual time video and detects human movement by calculating optical flow [1] field. The picture frame divided further into 3 by 3 segments. A histogram calculated of the single sub-segment frame can monitor the server access. The major purpose to checking person's behavior when facing access control point consists with a scrutiny camera for the face perception and key card reader, fingerprint reader, eye detection are unlocked its servers gradually for the fixed time. Detecting human movement accurately in a visual scrutiny system is crucial to avoid intruders from accessing servers. For this case, we avoid the many face perception and motion screenings with the help of subdivided frame for the targeted objective limited to single person behavior. Especially, our system mainly used in 360° cameras for monitoring people activity using sub-image.

Keywords: Movement detection, sub-image, Access control points, Optical flow.

INTRODUCTION

Human movement and his transit study is a major concept in nowadays. Many researchers debate transit perception allied to the person's behavior. Distinct face regions were tracked by Yacoob[2] and Davis in 1994 and symbols were revealed. In 2005 Dai et al. followed facial action analysis by scrutinizing HOF of the profile. In 2006 Zhu et al represented a new transit descriptor, which consists group of histograms based on optical flow. Later in 2007 Laptev[3] notice the points and a histogram of the gradient (HOG), HOF were calculated. Normalized the histograms and eventually train feature vector established. Several view images train used in Lee and Ahmed (2008)[4]. Authors used a union flow and local-global motion flow. Many writers worked motion approximation and its characteristics considered to make many applications each of their goals is to tweak the earlier developments, and our resemble is also same but majorly worked on access limits corresponds to it. We focused on this because lot security systems were hacking due to open access to servers. This system operates in actual time by continuously examine the action profile. Motion is estimated and captured in 3 by 3 sub-image format with a HOF is calculated. These servers are linked to sub-image container based on inputs available it spare ingress to the person.

PREVIOUS WORK

Histogram of optical flow(HOF) for the efficient portrayal of body transit detection with six bin taken into consideration by Janez Perš, Vildana Suli (2010) [5]. In which the actual time gesticulation of the body is significant, and the sub-images used for detection end, coupled with access points 1 & 2 such as keycard reader and fingerprint scanner. The 1 & 2 access points unlocked based the gesticulation of hands so that person can provide his identity to get access to it. This used scrutiny at entry points. Motion perception is the major to take any action for proposed work, like an opening door, face detection...etc. Therefore we easily manipulated at the entry points by hijack. Such systems not much secure to avoid intruders. Researchers faced this overcome to prevent intruders from getting access to security systems. For this case, we designed a compact multiple server access based system in actual time motion evaluated in sub-segmented.

OUR APPROACH

In earlier, motion estimation considered to take action for the person identified or else various behaviors of the personal activity. Our theme is to build in actual time video capturing system whose scene partition (or sub-image of all frame) capture into the analysis. Server's affixes to the sub-image provided access when the person is handy in right place of video capture by avoiding multiple faces to make ingress to unique end users. The ingress points such as face detection, hand movement detection for keycard reader and fingerprint scanner, unlocked by the server gradually by verifying person's identity for high protection.

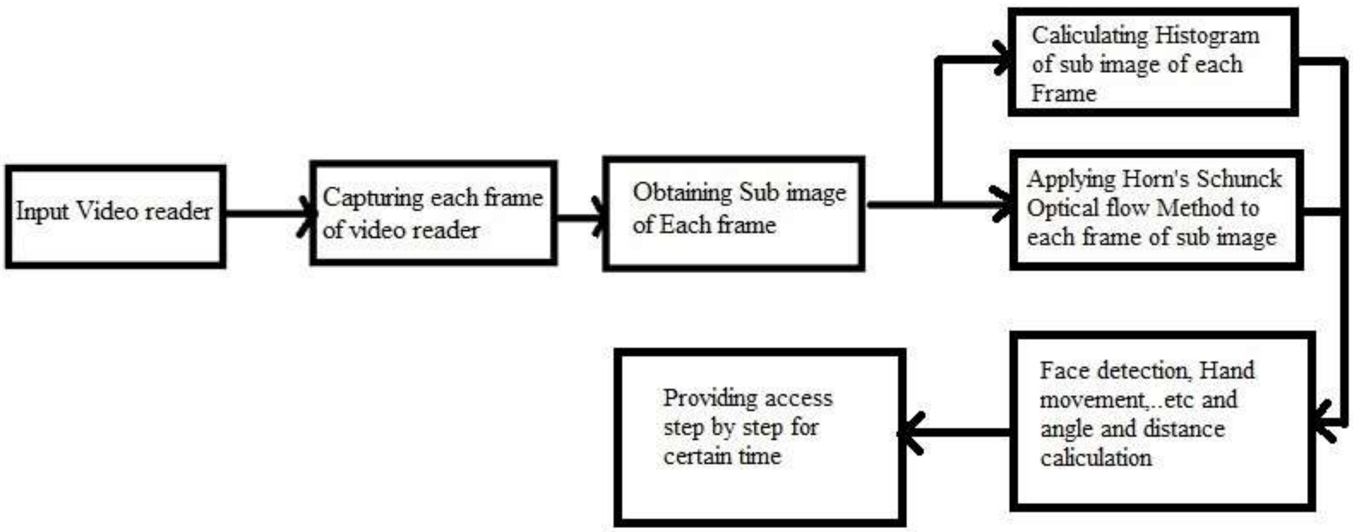


Fig.1: A Schematic form of the system.

3.1.Setup description and Implementation details:

To attain this, we demand a webcam and we required access providers like fingerprint and iris scanners ..etc. Each linked to their respective database servers. These are some requirements used to erect the system. The system implementation as shown below:

Step 1: setup video recorder in real time.

For this, we need configuration device that captures each stream of the frame which usually stored in temp data. And convert this rgb2gray Or else we can use RGB content information for all frame. All frame [7] uses same resolution so the image comparing may smooth.

Step 2: splitting each frame into sub-frame and area segmentation.

The succeeding steam of frames divided as science partitioning (or sub-image) into 3 by 3 segment.

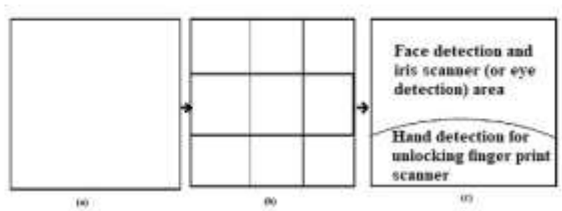


Fig.2: (A) unique frame of video reader. (B) Sub-frame of each frame. (C) Based on sub-frame and frame giving ingress to the detection area.

Step 3: Applying HOF and collecting histogram information of all sub-picture.

Here, each sub-frame histogram calculated, and its information stored for additional evaluation.

Step 4: (Algorithm) Determining of Horn-Schunck optical flow[6] method of each sub-frame.

Totally optical flow linking two images, we should resolve the flowing constraints, of each sub-frame.

$$I_x u + I_y v + I_t = 0$$

Where It, Ix & Iy are the spatiotemporal image brightness derivates and u, v are parallel and vertical optical flow. Assuming optical flow flat atop the intact picture, the Horn-Schunck method shrink this equation by guessing the velocity field $[u,v]^T$.

$$E = \iint (I_x u + I_y v + I_t)^2 \, dxdy + \alpha \iint \left\{ \left(\frac{\partial u}{\partial x}\right)^2 + \left(\frac{\partial u}{\partial y}\right)^2 + \left(\frac{\partial v}{\partial x}\right)^2 + \left(\frac{\partial v}{\partial y}\right)^2 \right\} dxdy$$

Where, $\frac{\partial u}{\partial x}$ and $\frac{\partial v}{\partial x}$ are the optical velocity component of spatial derivatives u and α Scale the global flatness term. The Horn-Schunck method shrinks foregoing equation to acquire [u v], for pixes in the frame. To evaluate this approach we have succeeding equations:

$$u_{x,y}^{k+1} = \bar{u}_{x,y}^{k} - \frac{I_x\left[I_x \bar{u}_{x,y}^{k} + I_y \bar{v}_{x,y}^{k} + I_t\right]}{\alpha^2 + I_x^2 + I_y^2}$$

$$v_{x,y}^{k+1} = \bar{v}_{x,y}^{k} - \frac{I_y\left[I_x \bar{u}_{x,y}^{k} + I_y \bar{v}_{x,y}^{k} + I_t\right]}{\alpha^2 + I_x^2 + I_y^2}$$

In these equations, $\left[u_{x,y}^{k}, v_{x,y}^{k}\right]$ is the rate judge for the pixel at (x,y) & $\left[\bar{u}_{x,y}^{k}, \bar{v}_{x,y}^{k}\right]$ is the locality average of $\left[u_{x,y}^{k}, v_{x,y}^{k}\right]$. For k = 0, velocity is 0 initially.

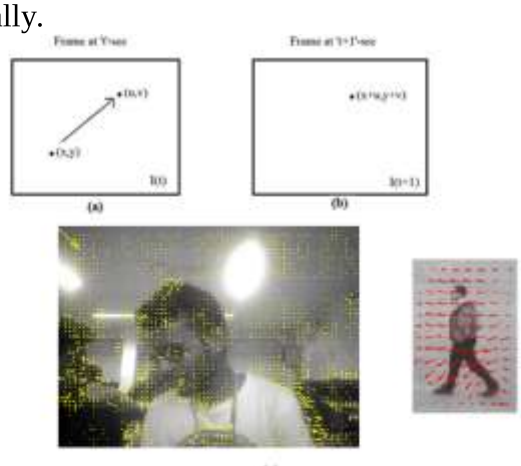


Fig.3: (a) frame at t sec of video. (b) The frame at t+1 sec with, v constraints.(c) Flow vector of horn schunk method.

To resolve u and v utilize the Horn-Schunck method:

Evaluate Ix and Iy utilize the Sobel convolution kernel,[-1 -2 -1;0 0 0;1 2 1], and its transposed form, of pixels in the first image. Compute It linking images 1 & 2 using the [-1 1] kernels. Taking the foregoing rate to be 0, and evaluate the average rate for apiece pixel using [0 1 0;1 0 1;0 1 0] as a gyrus kernel. Iteratively solve for u and v

Step 5: Connecting servers to selected sub-frame.

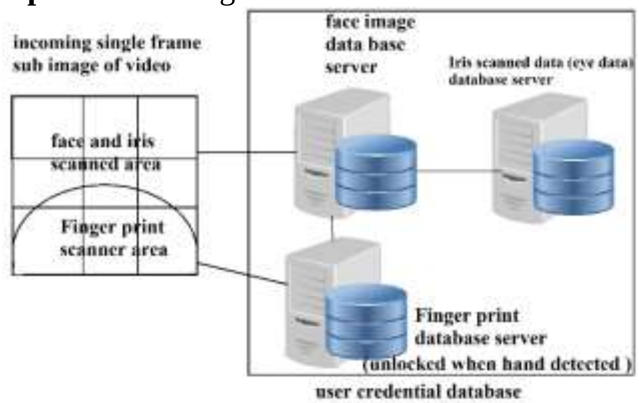


Fig.4: sub-frame server connections.

Step 6: Verifying user credentials and giving ingress to the considered time interval.

RESULTS AND DISCUSSION

Initial servers are locked, and the system is waiting for detection. when the face has detected the 2nd server unlocked for the period, and it will check the database and a terminal server for fingerprint scanner will open. This process is done by gradually and verifies the correct user credentials by avoiding the multiple detections.

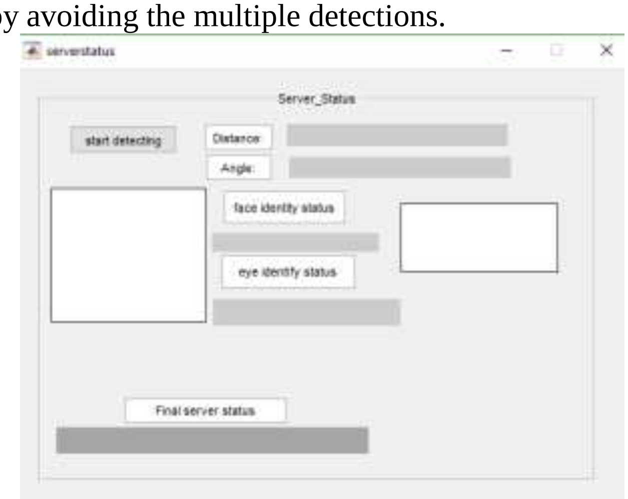


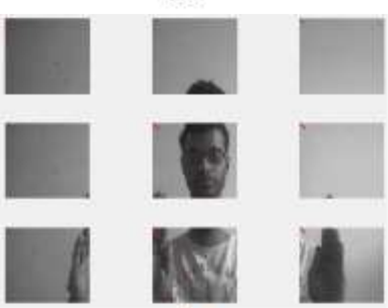
Fig. 5: Initial the server is not active waiting for motion detection to enable the face detection server for a designated period.

a

b

Fig. 6: (a) Background operation of the sub-monitoring region. (b) Here, face detected hand not detected based on area.

a



b

c

Fig. 7: (a),(b) Background operation of the sub-monitoring region and its angle of motion. (c) Here, face and hand detected based on area.

After face detection server verifies the sub-monitoring region angle and distance based on results the eye (iris scanner) server 2 enabled at a specified time.

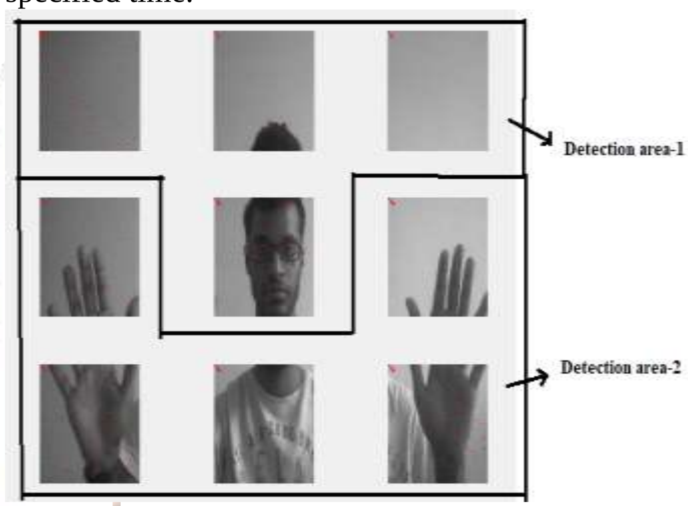


Fig. 8: sub-frame and frame giving ingress to the detection area.

Fig. 9: Finally it will check iris scanner and fingerprint unlocked its server and gave them ingress to the user by verifying the credential database.

CONCLUSION

we representing a dense of motion based high-security system with multiple access points manipulating optical flow build approach to person's activity classification. With person's motion perception identified, statistical values obtain from HOF to configure a small action representation. The method is real-time with good classification performance is effective under vertically different viewpoints. We demonstrate the task of identifying people by their motion when they approach to access control point. Our system helps for better protection of user information in many militaries and high-security side. It contributes to avoiding intruder which can access the server directly. we can able verify the false detection is having a report to the user when the 1st server is unlocked. We can also link the different access provider to assemble the security high. And record the user status report for the company in and out checkouts to prolong his activity. Our system majorly designed for future 360 camera sub-video monitoring and provide access limits based the application used by the user.

REFERENCES

1. Berthold K.P.Horn, Brian G.Schunck, Determining optical flow. From Artificial Intelligence Laboratory, Massachusetts Institute of Technology, Cam-bridge, MA 02139, U.S.A.
2. Black, M. J., Yacoob, Y. and X. Ju, S.: 1997, Recognising human motion using parameterized models of optical flow, *in* M. Shah and R. Jain (eds), *Motion-Based Recognition*, Kluwer Academic Publishers, Boston, pp. 245–269.
3. Laptev, I., Caputo, A., Schuldt, C. and Lindeberg, T.: 2007, Local velocity- adapted motion.
4. Ahmad, M. and Lee, S. W.: 2008, Human action recognition using shape and clog-motion flow from multi-view image sequences, *Pattern Recognition* (41), 2237–2252.
5. Histogram of optical flow(HOF) for efficient representation of body motion by Janez Perš, Vildana Sulić, Matej Kristan, Matej Perše, Klemen Polanec and Stanislav Kovačič, Faculty of Electrical Engineering, University of Ljubljana, Trzˇaška 25, 1001 Ljubljana, Slovenia.
6. Barron, J. L., D. J. Fleet, S. S. Beauchemin, and T. A. Burkitt. "Performance of optical flow techniques". *CVPR*, 1992.
7. K.Schindler and L.van Gool, "How many frames do human activity recognition require?," computer vision and Pattern Recognition in IEEE Conference of *2008. CVPR2008.*, pp. 1–8, 2008.