Name of the Sponsoring Agency: UGC- Major Research Project

Project Title   **: Intelligent Surveillance System for Human Action Analysis**

Date of Sanction and Ref No   **: Dt. 17-07-2012, F.No. 41-592/2012 (SR)**

Principal Investigator   **: Dr.B.Yogameena, Asso. Professor, Dept of ECE, TCE**

Project Duration   **: 17.07.2012 to 31.12.2015**

Project Amount Sanctioned   **: Rs.8,62,994.00/-**

Abstract

Pre-empting terrorist acts and providing security to citizens at home and public places have become top priorities of humanity around the globe. For this, a huge amount of information needs to be captured, processed, analyzed and interpreted. Various computer vision based techniques that are in vogue today, address these challenges pertaining to the application domains such as surveillance, control, and analysis. Development of 'smart' surveillance systems with fully automated video surveillance, have gained lot of attention in the sensitive locations such as airports, subways, malls and theatres. The need of the hour is the analysis of surveillance data in real time and to alert security system against the terrorism and unwanted security lapses. Therefore, the focus is to develop an intelligent video surveillance system to replace the traditional passive surveillance system. This project work addresses a few critical issues of video surveillance in dynamic scenes, primarily focusing on motion segmentation, foreground classification, consistent labeling over tracking and action or behavior analysis of an individual in a crowd. Motion segmentation for a fixed camera video sequence is achieved by background subtraction which is known to be a significant solution. This aims at detecting regions corresponding to moving objects such as vehicles and people in natural scenes. Sudden illumination changes, scene changes, camouflage and shadows are challenging problems for actual foreground detection. In this project, Self Adaptive GMM is used to detect the foreground and to eliminate shadows by modeling the shadow pixels using Multiple Feature Fusion (MFF) based combination of texture properties. Classification of moving blobs in a video is of focus for later processes such as tracking and activity analysis. The issue of moving object classification is to precisely extract the region corresponding to people from all moving blobs even when few subjects partially occluded. Also, the intra class variation is also considered. The issues of tracking and consistent labeling of people in a homogeneous environment where people with similar attire move, have also been addressed by modeling human skin colors using Gaussian likelihood and identification by histogram based approach. After successfully tracking, the person is identified and recognized specifically by using HOG and LBP features. Subsequently, the problem of understanding human behaviors from image sequences comes naturally. All the sub modules of a video surveillance system developed thus for in this project are validated by simulating algorithms on bench mark datasets like PETS 2001, CMU, Weizmann, CAVIAR, UMN, Hallway video and also data taken from the real time environments and work well in achieving higher detection rate and accuracy.

EQUIPMENT PURCHASED AND USAGE

Sr No	Name of Equipment/ Asset with manufacturer & model name, etc. and date of procurement	Sanctioned Amount Rs.	Actual Expenditure* Rs.	Usage
1.	Honeywell HCD5MIHX IP camera		Rs.80,008.00/-	Video Acquisition
2.	Honeywell HLM5V50F13-CCTV Lens		Rs.15,508.00/-	Video Acquisition
3.	Honeywell HNMSWVMS Network Video Recorder Software (NVR)		Rs.1,91,253.00/-	To store and record the dataset
4	Honeywell active alert premium (single channel add on license)-HAAP		Rs.107172.00/-	Video analytics validation
5	Accessories	Rs.4,00,000.00/-	Rs.6000.00/-	
Total			Rs.3,99,941.00	

PUBLICATIONS:
JOURNALS:
1. B.Yogameena, S.Md.Mansoor Roomi, R.Jyothi Priya, S.Raju, V.Abhaikumar People/Vehicle Classification by Recurrent Motion of Skeleton Features, IET Computer Vision, PP. 1-9, doi: 10.1049/iet-cvi.2011.0172.
2. Sindhu Priya K., Yogameena B., "Human Crowd Behavior Analysis Based on Graph Modeling and Matching in a Synoptic Video", International Journal of Innovative Research in Science, Engineering and Technology, 2014, Vol. 3, Special Issue 3, ISSN (print)2347-6710.
3. B.Yogameena, S.Kokila, K.Sindhu Priya, "Forensic Video Solution Using Facial Feature Based Synoptic Video Footage Record" in IET Computer Vision 2016.

INTERNATIONAL CONFERENCES:
1. Yogameena.Packiyaraj,P.Saravanan, Ma_Th Algorithm for People Count in a dense crowd and their behavior Classification, International Conference on Machine Vision and Image Processing, MVIP 2012, Dec14-15 2012.
2. Sindhu Priya K., Yogameena B., "Human Crowd Behavior Analysis Based on Graph Modeling and Matching in a Synoptic Video", International Conference of Innovative Research in Science, Engineering and Technology, ICIET'14 Mar 21and 22 March 2014.
3. Yogameena B, Sindhu Priya K.,"Synoptic Video Based Human Crowd Behavior Analysis for Forensic Video Surveillance", Eighth International Conference on Advances in Pattern Recognition, ICAPR 2015,January 04-07 2015
4. B.Yogameena, G.Seethalakshmi, "Local shape and Texture feature based moving object classification in traffic surveillance scenario. Sponsored 2nd International Conference on Innovations in Information Embedded and Communication Systems March 19 ICIIECS'15.
5. S. Kokila, B. Yogameena, "Face Recognition Based Person Specific Identification for Video Surveillance Applications", ICACCI-WCI 2015 at Kochi(Third International Symposium on women in Computing and Informatics), 10-13 Aug, 2015
6. Menaka Kandasamy, Yogameena Balasubramanian, Naganathini Chandrasekaran, " Improving Face Detection in Blurred Videos for Surveillance Applications" in International Conference on Computer Vision and Image Processing (CVIP'2016), IIT Roorkee (2016)
7. M.Ashvini, G.Revathi, B.Yogameena and S.Saravanaperumal, "View Invariant Motorcycle Detection for Helmet Wear Analysis in Intelligent Traffic Surveillance" in in International Conference on Computer Vision and Image Processing (CVIP'2016), IIT Roorkee (2016)

PH.D/M.E/PROJECT ASSOCIATES PRODUCED:
Ph.D Scholars: (Pursuing)
1. K.Menaka - Human Action Analysis for Intelligent Video Surveillance System
2. Vijayalakshmi - Face Recognition Algorithms for Video Surveillance Applications
3. C.Nagavani – Video Synopsis for Video Surveillance Applications

4. K.Sivakumar- Person Re-identification algorithms for Video Surveillance Applications

M.E Students/ Projects:

1. K.Sindhu Priya- Human Crowd Behaviour Analysis Based on Graph Modelling and Matching in a synoptic video
2. S.Kokila: Person Specific Identification by Face Recognition in Video
3. C.Nagananthini: Face Recognition based Authentication For Real Time Video Surveillance Applications

Project Associates:

1. A.Midhunkumar
2. K.Menaka
3. K.Sindhu Priya
4. S.Manjula devi