

SURVEILIA

Final Year Project Proposal

Session 2017-2020

A project submitted in partial fulfilment of the
COMSATS University Degree
of
BS in Computer Science



Department of Computer Science
COMSATS University Islamabad, Lahore Campus

19 February 2020

Project Registration

Project ID (for office use)						
Type (Nature of project)		<input checked="" type="checkbox"/> Development <input type="checkbox"/> Research <input type="checkbox"/> R&D				
Area of specialization		Video Analytics				
Project Group Members						
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Name & Signature of Batch Advisor (If students are eligible for FYP)			ZAHEER AHMAD GONDAL			

Plagiarism Free Certificate

This is to certify that, I am **IFRAH TEHLEEL** D/o **MUHAMMAD ASLAM RANJHA** group leader of FYP under registration no **CIIT/SP17-BCS-109/LHR** at Computer Science Department, COMSATS Institute of Information Technology, Lahore. I declare that my FYP proposal is checked by my supervisor and the similarity index is _____% that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

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Name of Supervisor: **DR. USAMA IJAZ BAJWA** Co-Supervisor (if any): _____

Designation: **ASSITANT PROFESSOR** Designation: _____

Signature: _____ Signature: _____

Approval of FYP Management Committee

Committee Member 1: Name: _____

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*Remarks: _____

Committee Member 2: Name: _____

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1.1 Project Abstract

The idea is to develop an application using deep learning through activity recognition algorithms and video analysis, which detects the anomalies such as burglary, theft, vandalism etc., in livestreaming CCTV and alarm the security instantly, either indoor or outdoor.

1.2 Introduction

Human Activity Recognition also termed as HAR, is the process of recognizing the human movement in an area that can be for say indoor/outdoor. It revolves around the recognition of goals and activities of agent/s from series of observations on the actions of agents and environmental conditions.

As we have seen numerous cameras located at every street, malls, organizations and even now houses have surveillance cameras that continuously monitor the movement of people. Even though they are placed to detect the human activities, there are group of people sitting behind those multiple cameras who are constantly seeing and analysing the video stream to see what action have been done by people or check any unusual activity. Clearly, it is an exhausting work, any sudden or minor deviation can result in various consequences. There were several incidents in buildings which included CCTVs but the system being inefficient and traditional couldn't detect them, Puyallup South Hill Mall Burglary [1] and Westfield Century City Mall Robbery [2] and many others are an example. There is a need for the system to automatically detect any kind of abnormal human activities so that complete safety is guaranteed.

Our proposed project, using Video Analytics, would perform the task of identifying these unexpected incidents. We will initially train and test our system using the Something-Something V1 [3], Something-Something V2 [4] and many other datasets. Video Analytics has become a hot topic in the world and by using the techniques of Video Analytics plenty of work has been done in detecting the human activities. Many research papers have been published regarding human activities.

There are many solutions proposed to detect human activity in surveillance videos, but the main issue is, they require the users to change their system architecture and system

hardware. That's why we are giving solution to them by providing an application that does not requires to update their systems or use new and expensive technology.

1.3 Motivation and Scope

Video analytics has become an emerging topic in the modern era. A lot of modification is being done on daily basis in Computer Vision. As a subfield, understanding the human activities is very demanding and we are keen to work in this domain to meet the concerns of security issues.

Security is one of the main concerns for every person, either at home or in public place. Nowadays traditional CCTVs are used at almost every place be it home or public area. Security guards sit behind those CCTV screens, inspecting the behaviour of people and monitoring their activities. But unfortunately, it is out of the capacity of human brain to focus on multiple screens at a single time. Multiple applications are being built to automatically detect any abnormal activity so the security can be ensured, and people can move without concerns about being unsafe. We are building an application which will automatically detect any kind of abnormality in surveillance CCTV streams. Our application will include

- Detection of abnormal events such as burglary, theft in real-time
- Detecting such activities which require the attention of security person so that such event can be dealt on time and can be minimized.

Although we have a lot of pros in our application but there are some small but technical cons; detection of abnormal and normal activities as separate is doubtful, especially in crowded areas, unavailability of labelled data makes system to be inefficient as it's learning is not enough and to balance privacy of crowd along with the detection of anomalies.

1.4 Related Work

A lot of work has been done in the field of anomaly detection through various approaches to detect abnormal activities. Few of the working systems or prototypes are discussed below.

1.4.1 Surveillance App

It is real time wireless surveillance cctv home system app [5] developed by Reservoir Dev, which detects noise or any movement and notifies the viewer. It allows the user to monitor his/her home and speak through user's device microphone to scare off the thief/intruder.

1.4.2 Advance intelligent video surveillance system (AIVSS)

AIVSS [6] is a research-based article describing the need of intelligent video surveillance systems in this era.

1.4.3 EYESPY

It was a final year project created by few students at COMSATS University Islamabad. It is basically a desktop-based program that use various Deep Learning architectures to detect Anomalies in Video feeds. The aim of the application is to assist the security personnel with monitoring for any kind of criminal activity in any video.

1.4.4 iCentana

iCentana [7] is AI video analytics for automated real time identification of critical events. It monitors cameras and automatically detects any abnormal activity. It identifies precursor events, learns and adapts automatically, rapidly reviews recorder video and detects abnormal precursor events. But the thing is they are costly and lack in localization of anomaly.

1.4.5 Dahua Security

A Chinese CCTV company [8] launched cameras to detect anomalies in public areas. Their mission is "Enabling a safer society and smarter living". They have cameras with integrated chips to be able to run deep neural networks right on board. Key technologies used are HDCVI Technology, Predictive Focus Algorithm, EPOE and ANPR.

1.4.6 Bosch Security

Robert Bosch GmbH founded Bosch Security [9] . This company has automated CCTVs and other systems to detect surveillance, intrusion detection, fire detection and voice evacuation systems.

1.4.7 Transform your city with Image Recognition:

New York City Department of Transportation [10] has picked video monitoring and Video Analytics that detects/keeps track of traffic jams, changing weather patterns and parking violations.

1.5 System Architecture

Live video stream will be passed through a less computation intensive model such as temporal shift module [11]. We shall be using models of python like pytorch, TensorFlow, etc. If any kind of anomaly is detected, the alarm is generated as shown in Figure 1 and the position of the anomaly detected will be highlighted.

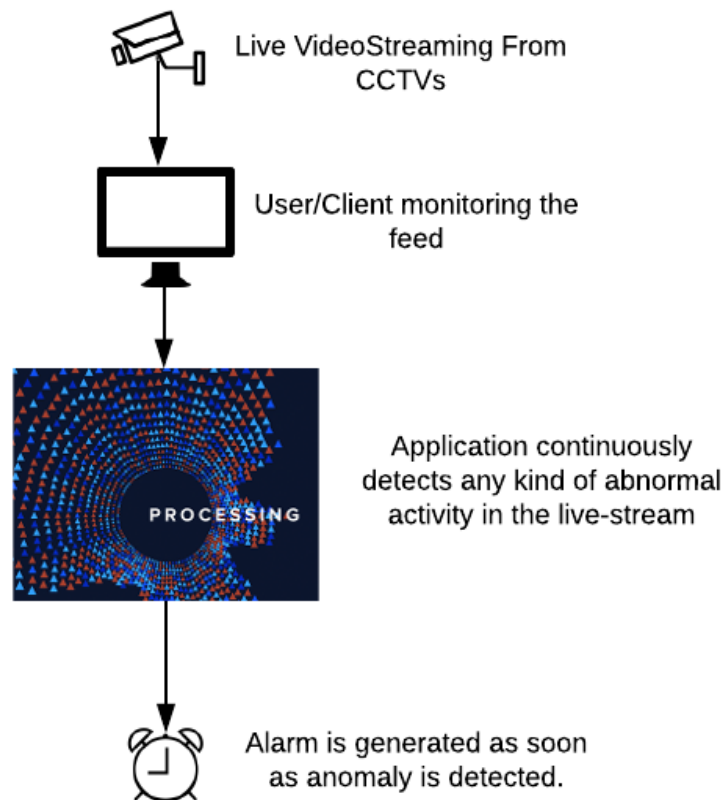


Figure 1: System Architecture

1.6 Goals and Objectives

Following are the goals and objectives of our FYP project.

- To develop an application that detects the activities and their interpretation through automated video analysis based on video data.
- To provide ease to the security personnel so that he may deal with such event in time.
- To detect any unusual activities just as humans, do.
- Notifying the security personnel on occurrence of abnormal activity

1.7 Individual Tasks

The Individual Tasks Table 1 describes the individual tasks of each member in the group i.e. testing, literature review, interfacing between hardware, training model, dataset research and front end development.

Table 1: Individual Tasks

IFRAH TEHLEEL	NAUMAN AKRAM	JAN MUHAMMAD MIRZA
Testing	Interfacing between hardware	Dataset searching
Literature Review	Training model	Front end development

1.8 Gantt Chart

Table 2 is Gantt chart graphically represents which tasks would be done in which duration, what tasks will be done in parallel and which tasks will be done in series.

Table 2: Gantt Chart

ACTIVITIES	February 2020	March 2020	April-May 2020	June-July 2020	August 2020	September 2020	October 2020	November 2020
PROPOSAL SUBMISSION								
PROJECT RESEARCH & DESIGN								
TRAINING PROTOTYPE AGENT WITH DATASET								
IMPLEMENTING LEARNED SKILLS TO CREATE PROTOTYPE1								
PROTOTYPE 2								
FINALIZING THE PROTOTYPE								
CREATING THE APPLICATION								
TESTING & BUG FIXING								
BETA RELEASE								

1.9 Tools and Technologies

- Python
- Anaconda
- Jupyter notebook
- pyTorch
- Spyder



1.10 References

- [1] “KOMO NEWS,” [Online]. Available: <https://komonews.com/news/local/security-video-shows-violent-south-hill-mall-burglary>. [Accessed February 2020].
- [2] “Mall Robbery,” [Online]. Available: <https://patch.com/california/centurycity/century-city-mall-robbery-triggers-panic>. [Accessed 9 February 2020].
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- [4] “Something-Something V2,” [Online]. Available: <https://20bn.com/datasets/something-something>. [Accessed 9 February 2020].
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- [11] “Temporal Shift Module,” [Online]. Available: <https://github.com/mit-han-lab/temporal-shift-module>. [Accessed 13 February 2020].

Appendix A

Turnitin Originality Report

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From Research Papers 2 (Research Papers 2)



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