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INTELLIGENT VIDEO SURVEILLANCE BASED ON OBJECT DETECTION

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Abstract : In today's fast-growing world of internet, we see most existing surveillance systems require human interaction where security guards watch the monitor wall and manually trigger alarms when they detect security violations. Due to the lack of attention of the operator, the possibility of missing alarms is high, even for well-trained security personnel. These issues lead to the need for an automated video surveillance system, an artificial intelligent system, which is designed to automatically tracks, security violations in a monitored scene. Video surveillance involves the act of observing a scene for a specific behavior that are improper, and by using the object detection algorithm detect the improper object and track that object. Video surveillance is having vast number of applications. The aim of the surveillance applications is to detect, track and classify targets. We have specifically focused on object detection.

Keywords: Video Surveillance, Detect, Object Detection

General Terms

CNN Convolutional Neural Network
COCOMO Constructive Cost Estimation Model
LSTM Long Short-term Memory

1. INTRODUCTION

Recent technology and market trends have demanded the significant need for feasible solutions to video/camera systems and analytics. The word surveillance is the combination of two word first is "sur" which means "from above" and the second is "vealer" which means "to watch". Video surveillance systems provide safety and security in public places. Video surveillance systems are used to watch out sensitive areas like banks, roads, shops, and borders where different types of incidents can take place such as theft and accidents, etc. The main aim of the video surveillance system is to solve different kinds of problems such as object detection, action recognition, object tracking. Detecting objects like humans in surveillance videos is a challenging task due to their different appearances and variety of poses they can adopt. Using automated systems to detect object events in this scenario is highly desirable and leads to better security and broader surveillance. In general, the process of detecting object in videos is a challenging problem that currently attracts much attention by researchers, it also has broad applications across industry verticals, and recently it has become one of the essential tasks of video analysis. There is a huge demand for developing an object detection approach that is fast and accurate in real-world applications.

1.1Motivation

1.1.1 Security and surveillance are important issues in today's world.
1.1.2 The recent acts of terrorism have highlighted the urgent need for efficient surveillance.

2. PROBLEM DEFINITION

Object detection is technique of computer vision. Finding a particular object is a problem in computer vision. This system helps to solve this problem. It will be helpful for army, police department to find particular object in video segment within minute. To develop intelligent video surveillance to detect an object for video surveillance system.

3. SOFTWARE REQUIREMENTS

3.1.1 Project Scope

The purpose of this project is to build a video surveillance system that will detect the specific object from video. The system is based on the Convolutional LSTM network . Using our systems to detect object in this scenario is highly desirable and leads to better security and broader surveillance.

3.1.2 User Classes and Characteristics User Modules:

1. Users interact will give input video and image.

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3.2 Functional Requirements

3.2.1 System Feature 1(Functional Requirement):

• The flexibility and scalability provided by a software cannot be compared with a hardware. Therefore, it is a must that your software is able to integrate with other security systems present in your organization

. • It is often possible that a solution is assembled and made up of different brands. In such situations, it is extremely important that it supports other brands' cameras and devices

3.2.2 System Feature 2(Functional Requirement):

• Front-end Software: PyQt5: PyQt5 is a Python binding of the cross-platform GUI toolkit Qt, implemented as a Python plug-in. PyQt5 is free software developed by the British firm Riverbank Computing.

• Back-end Software: OpenCV: Open Source Computer Vision is a library of programming functions mainly aimed at real-time computer vision.

Python: It is an interpreted, high-level, general-purpose programming language. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

3.3 External Interface Requirements

3.3.1 User Interfaces

• Interface Page

3.3.2 Hardware Interfaces

• NVIDIA GPU card with CUDA Compute Capability 3.5 or higher: CUDA (Compute Unified Device Architecture) is a parallel computing platform and application programming interface (API) model created by NVidia. CUDA makes it possible to use the many computing cores in a graphics processor to perform general purpose mathematical calculations, achieving dramatic speedups in computing performance.

• NVIDIA Drivers: It is a program used to communicate from the Windows PC OS to the device. This software is required in most cases for the hardware device to function properly.

3.3.3 Software Interfaces

Following are the software's used for the Object Detection System

3.3.4 Communication Interfaces

3.4 Nonfunctional Requirements

3.4.1 Performance Requirements

• System can produce results faster on 4GB of RAM.

• It may take more time for peak loads at main node.

• The system will be available 24 by 7 hr. 8

• Once there is a fatal error, the system will provide understandable feedback to the user

3.4.2 Safety Requirements

A registered user can only access the system.

3.4.3 Security Requirements

• After detecting the object bounding box should be generated immediately.

3.4.4 Software Quality Attributes

Accuracy: - The level of accuracy in the proposed system will be as high as possible. The software is user friendly while using it. Image Quality in real time environment is clear (Noise free).

Reliability: - The reliability of the proposed system will be as high as possible. The reason for the increased reliability of the system is that now there would-be proper object detection as well as better functionality as well as ease of use for specific users.

3.5 System Requirements

3.5.1 Database Requirements

3.5.2 Software Requirements

Operating System - Windows 7 and above 3.5.3

Language - Python 3

Libraries - Numpy, Pandas, OpenCV.

3.5.3 Hardware Requirements

• Processor - 1.5GHz or above

• Hard Disk - 250GB

• RAM - Minimum 4GB

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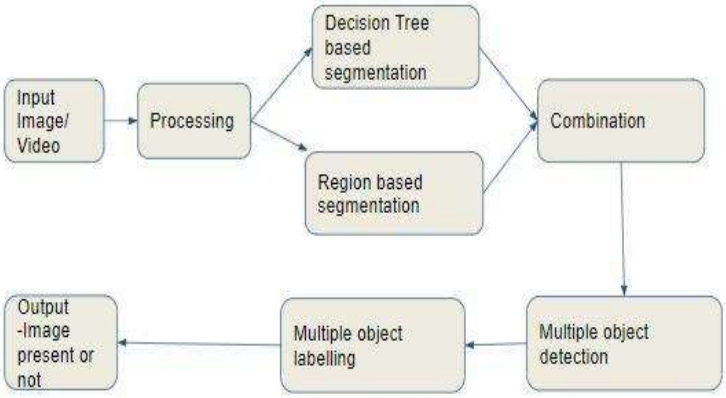
4. SYSTEM DESIGN

4.1 System Architecture



4.2 Data Flow Diagrams:

4.2.1 DFD Level 0

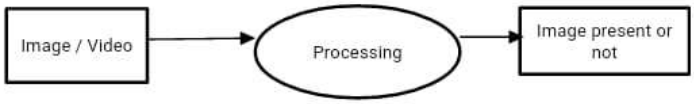


Figure 4.2: Level 0 Data Flow Diagram for Video Surveillance

4.2.2 DFD Level 1

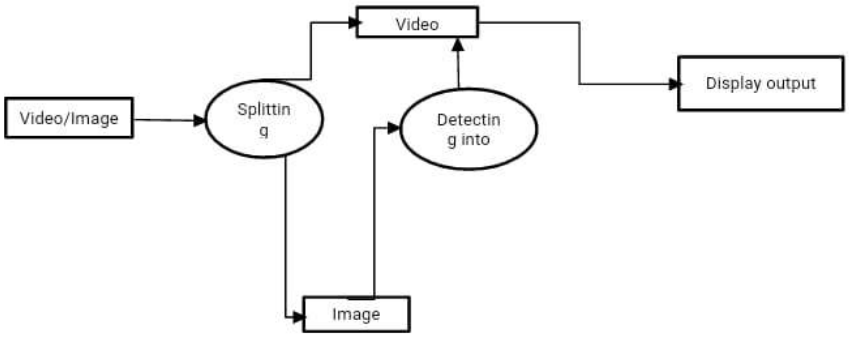


Figure 4.3: Level 1 Data Flow Diagram for Video Surveillance

4.2.3 DFD Level 2

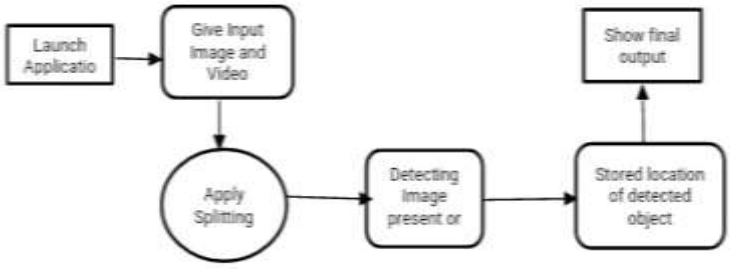


Figure 4.4: Level 2 Data Flow Diagram for Video Surveillance

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4.3 AML Diagram:

4.3.1 Activity Diagram

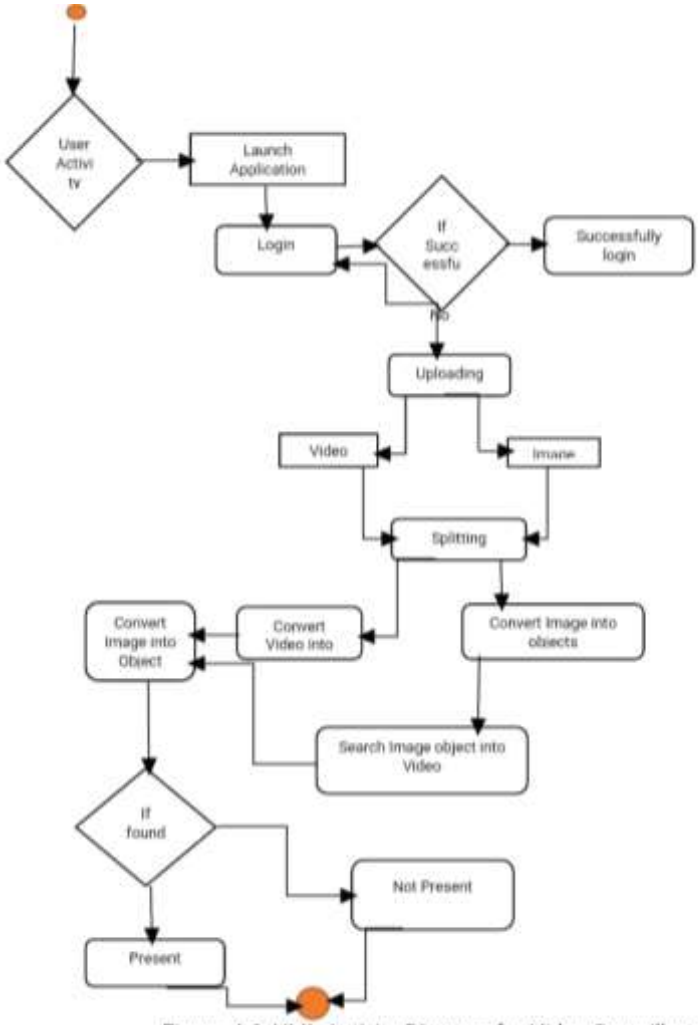
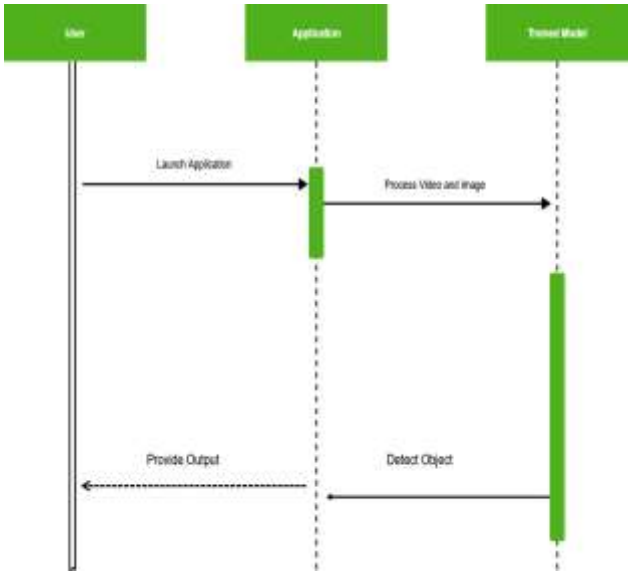


Figure 4.6: UML Activity Diagram for Video Surveillance

4.3.2 Sequence Diagram:



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4.3.3 Class Diagram

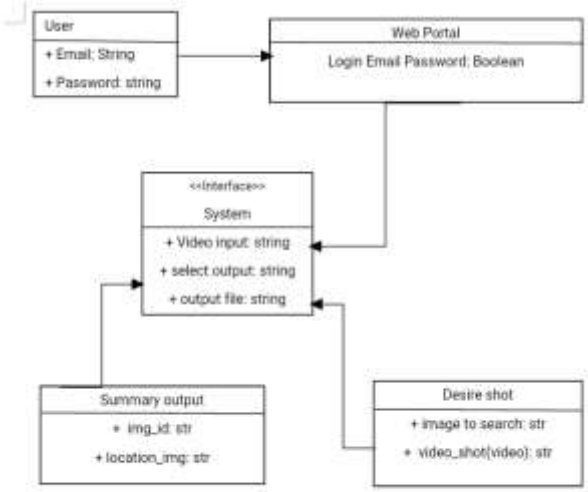

Figure 4.8: UML Class Diagram for Video Surveillance

5. OTHER SPECIFICATION

5.1 Advantages

- Real time detection,simple network structure
- Locate objects with rotation bounding box,using rotation anchor.

6. CONCLUSION

we have successfully applied deep learning to the challenging video object detection problem. The advantage of our model is that it is semi-supervised-the only ingredient required is a long video segment containing only normal events in a fixed view.

7. FUTURE SCOPE

This application can be implemented at public places such as traffic, government offices in order to help the security surveillance.

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