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Intelligent Video Surveillance System

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A B S T R A C T

Video Surveillance has been used in numerous operations including sanatorium, senior care and home nursing, etc. Intelligent video surveillance systems are able of enhancing situational mindfulness across multiple scales of space and time. This design makes use of OpenCV library to capture camera images and descry intrusion using image comparison fashion. Once the comparison is done and an intrusion is set up, it cautions and also admin can take applicable action. Intelligent Surveillance is the use of automatic videotape analytics to enhance effectiveness of surveillance systems. This system introduces automatic identification of persons exertion to enhance the security system in sanatorium this enriches the current video surveillance systems. The applicable data is captured and alert is given to the stoner by transferring correspondence. This system maintains the security at numerous locales and descry if anyone falls in front of camera and cautions to the operation.

Keywords: OpenCV, surveillance systems, camera, home nursing

1. Introduction

Intelligent video surveillance involves the act of observing a scene or scenes and looking for specific actions that are indecorous or that may indicate the emergence or actuality of indecorous geste. Common uses of videotape surveillance include observing the public at the entry to sports events, public transportation(train platforms, airfields, etc.), and around the border of secure installations, especially those that are directly bounded by community spaces.

The videotape surveillance process includes the identification of areas of concern and the identification of specific cameras or groups of cameras that may be suitable to view those areas. However, that's also helpful to the process, If it's possible to identify schedules when security trends have passed or may be likely to do. also, by viewing the named images at applicable times, it's possible to determine if indecorous exertion is being.

The thing of a multiscale shadowing system is to acquire information about objects in the covered space at several scales in a unified frame. Traditional videotape surveillance systems are restrained to a simple on and off switch, which results in thousands of hours of fuzzy and frequently unworkable videotape. This makes effective surveillance, felonious identification, and covering nearly insolvable.

Smart videotape can give the following advancements on former security monitoring services

- Tracking a moving target
- Automatic audio and visual discovery of suspicious exertion, which can spark admonitions and alert homeowners and business possessors to implicit pitfalls.
- High- description picture quality, as well as night vision technology touched off by stir detectors, meaning the system isn't running while nothing is passing at your position.
- Inauguration of videotape recording, admonitions, cautions, or other conduct.
- Cautions notifying drivers or field labor force
- Camera tampering discovery
- Vehicle license plate recognition
- Enhanced Searching to display only the crucial events that passed within a specific time frame so druggies can see snappily and directly what happed while they were gone.

By discrepancy, adding videotape to a home security system equipped with smartphone control, gives homeowners the capability to pierce live visual and audio feeds inside their home at any time and from anywhere.

With the important combination of videotape and smartphone control, you can have live videotape and audio of your home or business at your fingertips in a moment's notice. As culprits come more sophisticated it's important to stay one step ahead with the rearmost and most sophisticated security technology available.

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2. Problem Statement

In video surveillance system, traditional systems are susceptible to environmental variation i.e., change in light, stir in the background due to water, change or reflection of light, etc.

It's necessary to make use of automatic video analysis technologies for developing smart surveillance system which can prop the mortal driver in both detecting and replying to implicit pitfalls. Smart Video Surveillance System (SVSS) provides videotape- grounded object analysis capabilities.

3. Literature Survey

Sr. No.	Name	Publish Date	Publisher	Author	Description
1	Research of Intelligent Video Surveillance System based on Artificial Neural Network	2022	IOP publishing ltd.	Chuyun She	In order to improve the video monitoring capabilities, this paper designs an intelligent video surveillance system. Firstly, it analyses the current problems of video surveillance, and then proposes intelligent requirement in three aspects.[1]
2	Smart video surveillance: a review through deep learning techniques for crowd analysis	6th June 2019	Springer Open	G. Sreenu	CCTV cameras are implemented in all places where security having much importance.[2]
3	Intelligent Video Sur veillance system	18th January 2018	IEEE	Virgil Claudiu Banu, Ilona Mădălina Costea, Florin Codrut Nemtanu, Iulian Bădescu	This scientific paper present architecture for a perimeter security system dedicated to critical transport infrastructures protection, such as the airport.[3]
4	Fall Detection System for the Elderly	2017	IEEE	Joseph Santiago, Eric Cotto, Luis G. Jaimes, Idalides Vergara-Laurens	This paper presents a fall detection system that monitors in real-time an older adult. The system defines two major components: a wearable device and a cell phone. The wearable has the capability of communicating with a cell phone can be located in a 100ft radius. Once, the wearable device detects a fall, it sends an alert to the cell phone; then the cell phone alerts to the emergency contacts defined by the user. The main idea is to avoid the need of carrying the cell phone every time. In addition, our system has a panic button that can be used in order to alert the emergency contacts in the event that the user feels that a fall may happen.[4]
5	A Smart Surveillance System with Multiple People Detection, Tracking, and Behavior Analysis	2016	IEEE	Chia-Jui Yang, Ting Chou, Fong-An Chang, Chang Ssu-Yuan, Jiun-In Guo	This paper proposes an intelligence surveillance system in indoor environments, which support the functions of people detection, people tracking, and behavior analysis. Strong variation of lightness by switching lights and frequent crossing of people are two major design challenges of the proposed system, which will decrease the detection accuracy. Therefore, we

					propose a mechanism of updating background to react to the variation of lightness.[5]
6	A comprehensive study on motion detection in video using surveillance system	4th April 2014	IJERT	Kalpesh Limbasiya	Through this video surveillance system, we can achieve security without any physical need.[6]

3.2 Proposed System

One of the challenges that numerous securities systems face is the incapability to allow the system to perform certain functions without an driver covering the progress of the system, automatically. People cannot operate twenty- four hours a day. mortal drivers have a limit to operate during the time they're awake. People will always bear sleep and indeed when they're awake, they cannot sit in one place for a long time without any distraction. That's why there are unique features in the multi-camera videotape system that can make significant impacts in the security assiduity. The specialized aspect of the technology is exceptional and it can help numerous people to fight security challenges they face in their diurnal lives. It's important to consider these aspects when opting which type of security systems are demanded to borrow. Our approach could descry and fete a mortal target from vids taken from cameras mounted on the wall to cover a target area. The proposed approach is to perform fall discovery, vehicle crash discovery and social distancing discovery from CCTV cameras in real- time. The algorithm which we've used for developing this system is YOLO (You Only Look Once).

4. Architecture

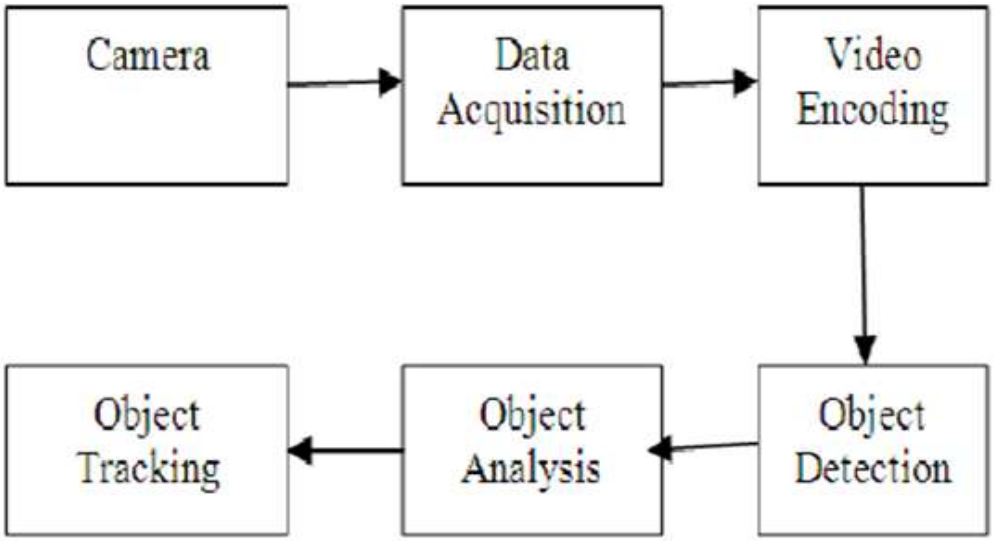


Figure 1 - Block diagram for Intelligent Video Surveillance System

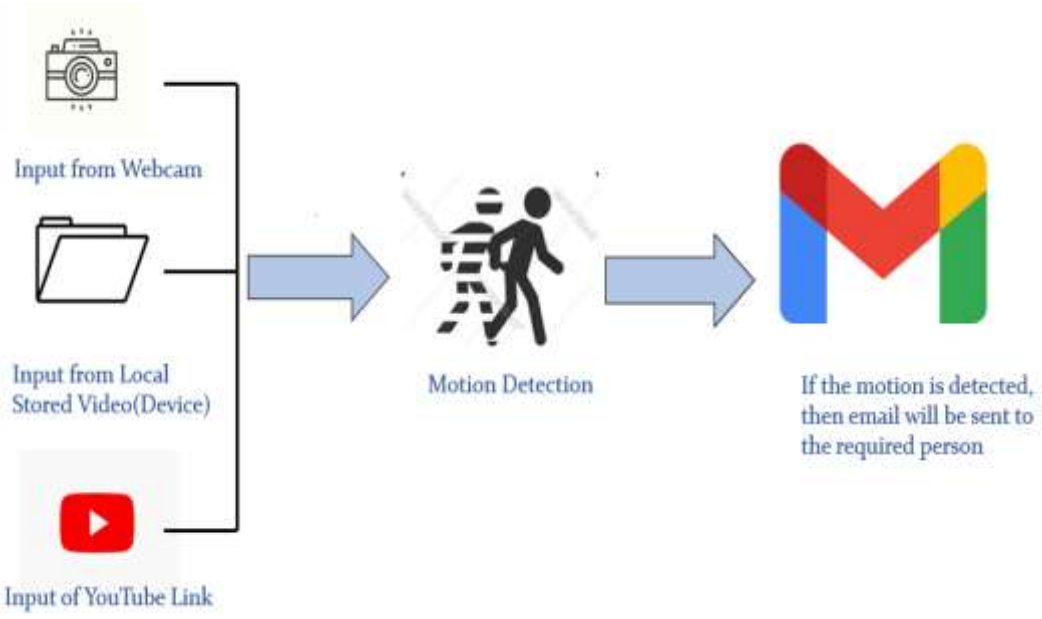


Figure 2 – Working model of Intelligent Video Surveillance System

4.1 Algorithm/Flow:

1. Start.
2. Capture video from webcam / video / YouTube link.
3. Detect motion from media captured.
4. Send alert message via mail/prompt.
5. Stop.

5. Yolo Algorithm

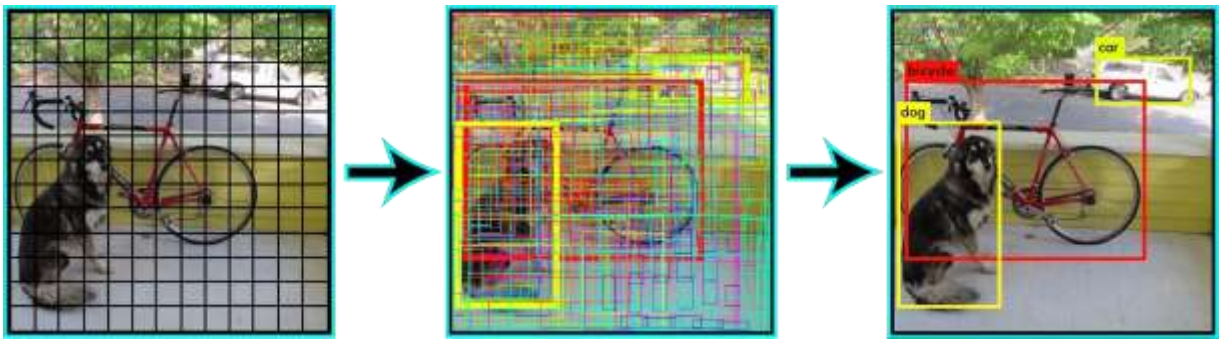
YOLO proposes the use of an end-to-end neural network that makes prognostications of bounding boxes and class chances all at formerly. Compared to the approach taken by object discovery algorithms before YOLO, which repurpose classifiers to perform discovery, YOLO proposes the use of an end-to- end neural network that makes prognostications of bounding boxes and class chances all at formerly. Following a unnaturally different approach to object discovery, YOLO achieves state- of- the- art results beating other real- time object discovery algorithms by a large periphery.

While algorithms like Faster RCNN work by detecting possible regions of interest using the Region Offer Network and also perform recognition on those regions independently, YOLO performs all of its prognostications with the help of a single completely connected subcaste. styles that use Region Offer Networks therefore end up performing multiple duplications for the same image, while YOLO gets down with a single replication.

The YOLO algorithm works by dividing the image into N grids, each having an equal dimensional region of SxS. Each of these N grids is responsible for the discovery and localization of the object it contains. similarly, these grids prognosticate B bounding box coordinates relative to their cell equals, along with the object marker and probability of the object being present in the cell.

This process greatly lowers the calculation as both discovery and recognition are handled by cells from the image, but — It brings forth a lot of indistinguishable prognostications due to multiple cells prognosticating the same object with different bounding box prognostications.

YOLO makes use of Non-Maximal repression to deal with this issue.



6. Methodology

- OpenCV:

OpenCV (Open-Source Computer Vision Library) is an open-source computer vision and machine learning software library. OpenCV was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products

- CUDA:

CUDA® is a parallel computing platform and programming model developed by NVIDIA for general computing on graphical processing units (GPUs). With CUDA, developers are able to dramatically speed up computing applications by harnessing the power of GPUs.

- Darknet:

Darknet-53 is a convolutional neural network that acts as a backbone for the YOLOv3 object detection approach. The improvements upon its predecessor Darknet-19 include the use of residual connections, as well as more layers.

6.1 Hardware and Software Details:

6.1 Hardware Environment

- Camera
- Graphic Card

6.2 Software Environment

- Visual Studio Code
- Python
- OpenCV Library
- Darknet Library
- Gmail

7. Future Scope

- Improve the vehicle crash detection model.
- Currently website is deployed locally using flask and uses our own computer's GPU. As our code uses GPU, it would cost us money to deploy our website on cloud servers like Google Cloud and AWS. But our future goal is to deploy the website globally from Google Cloud by using their GPU's.
- Calling Notification.
- Live Video recording.

8. Conclusion

The proposed system is an intelligent video surveillance system with processing at the edge, which can detect and track object in a robust and reliable way. The system can work in real-time and can track multiple objects in the camera's field of view accurately with robust re-identification. Thus, we have learned:

- To create a system that will track and monitor the scene.
- Detection of objects using trained models.
- Real-time detection and recognition of any object instantly.

9. Reference

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