



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118

9940 572 462

6381 907 438

ijrset@gmail.com

www.ijrset.com

Smart Intruder Detection System Using Machine Learning

Devyani Bhamare¹, Ashwini Kale², Dnyaneshwari Chaudhari³, Mansi Lokhande⁴, Rutuja Jape⁵,
Rushikesh Mane⁶

Department of Information Technology, SRES's Sanjivani College of Engineering, Kopergaon, (MH), India.

ABSTRACT: Now a days security is biggest concern in every field such as colleges, schools, banks, houses, office. Security is important in society as it gives person a sense of safety which in general gives him satisfaction. By using security controls we can prevent suspicious activities. To develop a solution for this problem we use methodologies like YOLO algorithm, open source computer vision technique and CNN. The present system uses OpenCV Python. The image is snatched and contrast with the saved image of the authorized person of the dataset. The System can differentiate an authorized and unauthorized person by comparing and if it is an unauthorized person then the Alert will be sent to the System.

KEYWORDS: Image Captioning; Face Recognition; Facial Expression Recognition; Object Detection; Yolo v3, open CV, CNN.

I. INTRODUCTION

Smart Surveillance System has been a major factor in today's world of security. Smart Intruder Detection System is created to detect unauthorized entry into protected areas such as a building, shops, colleges and restrict the unauthorized access to increase the security of the area[1]. The proposed system uses Computer Vision technique to identify the image/videos of Intruder and their weapons used. Smart Surveillance System uses motion sensor or facial detection system based on the IOT[2]. The system triggers the false alarm, for example, if the system uses motion sensor, strong wind and animals may mistakenly trigger an alarm. Therefore, for strong Surveillance System, we introduce a Smart Intruder Detection and Surveillance System (SIDSS)[1].

The created system uses Computer Vision techniques to accurately identify intruders and their weapons[1]. The system uses Convolutional Neural Network (CNN) for threat and intruder detection system and YOLO (You Only Look Once) algorithm to detect the firearms[3].

II. LITERATURE REVIEW

Xin Zhang, Won-Jae Yi and Jafar Sanjivani have proposed the system in paper titled "Home Surveillance System Using Computer Vision And CNN", They introduce a home surveillance system that utilizes computer vision techniques to recognize intrusions and detailed threat information including classifying types of trespassers and specific weapons used. Their motto is to identify intrusions and is achieved by their Smart Intruder Detection and Surveillance System (SIDSS) which involves 3 stages of computer vision algorithms. 3-stage SIDSS consists of an optimized convolutional neural network (CNN) for threat and intrusion detections, cascading classifiers for locating any potential intruders with a correcting mechanism to overcome undetected threats from the previous stage, and principal component analysis (PCA) to efficiently train the facial recognizer to accurately differentiate passersby from potential intruders. Our system is scalable for various surveillance events and can be expanded with additional pre-processed datasets added to the SIDSS model to manage greater surveillance areas. Through this enhanced configuration, the system can achieve enhanced accuracy of recognizing a broad range of weapons used and intruders.[1].

Akshada Deshmukh, Harshalata Wadaskar, Leena Zade, Neha Dhakate, Preetee Karmore. They introduce a "Webcam Based Intelligent Surveillance System" in which Intelligent Monitoring Sensor is an application which consists of a digital camera which is used as a powerful motion detector. Instead of using various ultra-sonic or other sensors, they are using camera as the sensor in system. By combining the software and the camera they use this system as an Intelligent monitoring sensor. The camera is used to catch the live images of the area in which it is being implemented,

if any object is moving. The captured images are stored in a particular folder. The stored images will be then useful to work on[2].

RashmiranjanNayak ,Mohini Mohan Behera,Santos Kumar Das,"Video-based Real-time Intrusion Detection Systemusing Deep-Learning for Smart City Applications".A novel video-based Intrusion Detection System (IDS) usingdeep learning is proposed. Here, You Only Look Once (YOLO) algorithm is used for object detection and intrusion is decided using our proposed algorithm based on the shifted center of mass of the detected object. Further, Simple Online and Realtime Tracking (SORT) algorithm is used for the tracking of the intruder in real-time. The developed system is also implemented and tested for live video stream using NVIDIA Jetson TX2 development platform with an accuracy of 97% and average fps of 30. Here, the proposed IDS is a generic one where the user can select the region of interest (the area to be intrusion free) of any size and shape from the reference (starting) frame and potential intruders such as a person, vehicle, etc. from the list of trained object classes. Hence, it can have a wide range of smart city applications such as person intrusion free zone, no vehicle entry zone, no parking zone, smart home security, etc[3].

So, it has been observed, such system is developed for this that purpose. Such system can be veryuseful to make our house or office even college school to detect the person in any worst scenario is happen.

III. IMPLEMENTATION DETAIL

YOLO Algorithm: YOLO is the algorithm which detects the objects and used for real time applications. It is deep learning architecture 'you only look once and has higher accuracy. YOLO means it checks the objects only once and then detects the firearms.

YOLO actually works based on convolutional neural network. CNN takes the input image and it is outputting some featuremaps. For example:- input image has dimension[416×416] then output feature has dimensions [13 ×13×B×(5+C)].Input image is divided into imaginary grid format using single neural network.

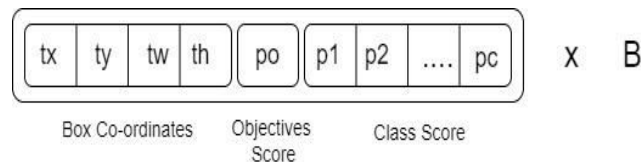


Fig1:YOLO Structure

First four boxes are x,y,w,h is coordination for bounding box on image for object detection. P0 tells that shows much probability that bounding box contain an project which is called objectnessscore.Last box is class probability which shows the probability and generated bounding boxes are weighted by the predicted probability.

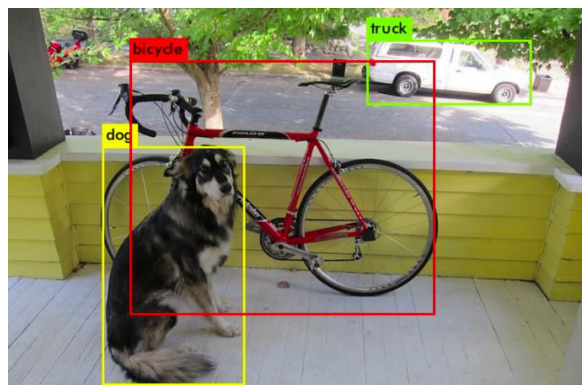


Fig 2: Detection of object using YOLO Algorithm

As shown in figure Fig 2. YOLO algorithm is detect the object. The algorithm is correctly identifies the object such as in fig 2, dog,bicycle,truck. It gives the object information at once look.

CNN is convolutional neural network which is artificial neural network it is used for analysing image. CNN are widely used in image recognition, image classification, object detection and face recognition. CNN image classification takes an input image, process it and classify it under certain category.

CNN is another type of neural network that can be used to enable machine to visualize things and perform task such as image classification, image recognition and object detection. Image classification is task of taking an input image and gives output as class [a cat , a dog etc] or a probability of classes that best describes image.

It is one of the type of neural network model which is designed for working with image data. In CNN the input image pass through a series of convolutional layers ,pooling layer and full connected layer and finally productive output which can be single class or probability of classes that best describes the image .

We use CNN because it is feedforward neural network which is used for representation of image but in case of complex image, CNN will fail to give better prediction, that is because it cannot learn pixel dependencies present in the images. CNN can learn multiple layers of feature representation of image by applying different transformation. In CNN ,no of parameter for the network to learn is significantly lower than multilayer network.

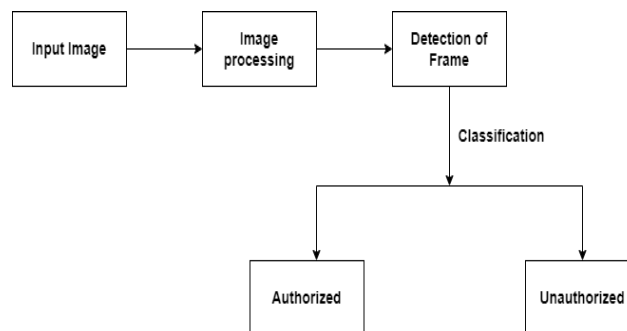


Fig3:Architecture of System

The fig 3 shows the architecture of system where it include input image , Image processing , and Detection of frame blocks.

Face Recognition Module :

The module is devoted to acknowledge the faces of people for eg.friends,family members etc. It will be useful for the person to identify people in front of him.

The face recognition module is divided into following steps.

1.Determine face in the image:

The detection of a face in the image is done by using OpenCV[6] (computer vision library) and haar cascade[8]. The location of the face is mapped over the image.

2.Extracting the features:

After recapture the area of interest the feature extraction takes place. The features like Height/width of the face. Color of the face. Width of other parts of the face like lips, nose, etc. Height and width may not be reliable since the image could be resize to a smaller face. However, even after resizing, what remains unchanged are the ratios – the ratio of the height of the face to the width of the face won't change. These features get stored in form of XML data.

3.Comparing with database:

The removing features then get compared with the existing data of faces along with the name of the face. If the match is found then the labeled name is forwarded to emotion detection if the face is doesn't exist then the user is asked to provide the name of the face and then it gets stored in the database.

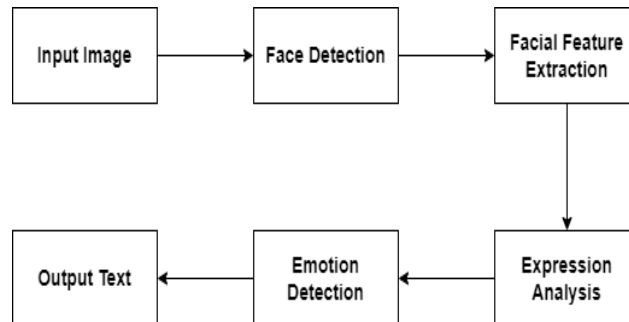


Fig 4:Flow of operation in face recognition

In our project the first step of implementation is to start the camera to capture the image by using open CV. And thenit extract the features of images by using CNN .

The second step of implementation is to recognize face where it classifies authorized and unauthorized person by comparing with stored database in system.

Then we have used YOLO algorithm which detects the objects and weapons by dividing the image into grid format then each grid is processed then finally camera detects the authorized and unauthorized person by noticing the objects and weapon then it gives the alert message to the system .

IV. RESULT ANALYSIS

The proposed system reduces workload and saves time than the existing observation system because it informs the intrusion time among the stored data.

We have collected and stored the data of 50 peoples in our system database. We have given the input to the system and with help of stored data we trained the proposed system and we detect the intruder and authorized and unauthorized person with 70% accuracy.

In figure 5 system has correctly detected the known person with weapon .

Figure 6 indicates unauthorized person is detected because that person data is not in our database.

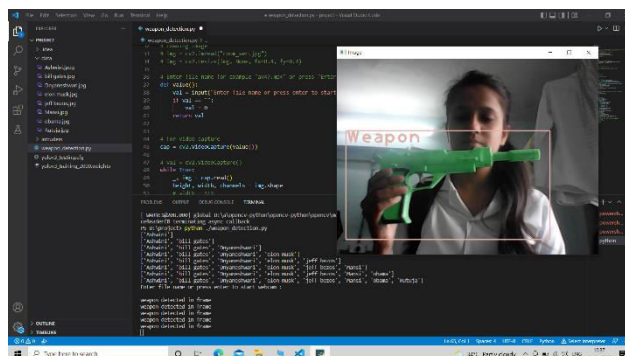


Fig5 : Weapon Detected with Authorized person

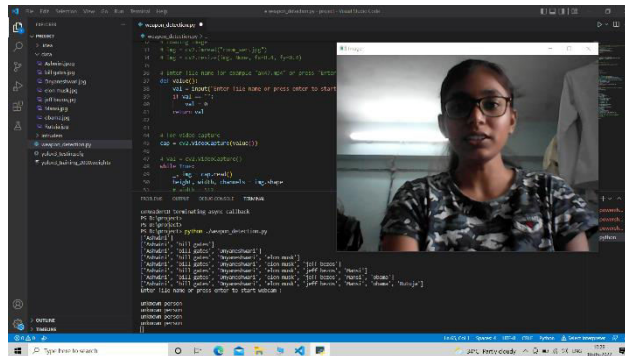


Fig 6 : Unauthorized person is Detected

In every field of security this system is best suitable because it is cost effective , less hardware required, less time and space is required.

V. CONCLUSION

In this project, we have introduced an efficient security system which includes identification of suspicious objects like gun, knife, etc. For such real time object detection we have used YOLO v3. Deep learning algorithm which is able to detect the object in one single algorithm run that makes the system more faster[3].

This proposed system is also capable to detect an unauthorized entry of people in surveillance area where this system is implemented. After identification of suspicious objects or detection of an unauthorized entry it gives an alarm which makes this security system even more smart and efficient[1].

VI. ACKNOWLEDGMENT

This work is supported by Sanjivani College of Engineering, Kopargaon. We are thankful to our management for providing us a platform to complete our research work. We are thankful to our beloved Director for his continuous support and encouragement to climb up new heights. We are very much thankful to our Head of Department, Dr. M. A. Jawale for her guidance and support. We are thankful to our colleagues and friends, without their support it would not be possible to complete this work. Love and blessing showered by our parents kept us motivated to complete this work. We would like to say thanks to our reviewers for their insights and comments. Lastly, we are thankful to each and every one who has directly or indirectly helped us to make this research successful.

REFERENCES

- [1] Xin Zhang, Won-Jae Yi and JafarSaniie Embedded Computing and SignalProcessing (ECASP) (2019) IEEE.
- [2] AkshadaDeshmukh, HarshalataWadaskar, LeenaZade, Neha Dhakate, Karmore.They introduce a"WebcamIntelligent Surveillance System"(March 2013).
- [3] RashmiranjanNayak, Mohini MohanBehera, Umesh Chandra Pati, Santos Kumar Das Video-based Real-Time Intrusion Detection System using Deep- Learning for Smart City Applications IEEE ANTS (2019).
- [4] Srujan Patel, Naeem Patel, SiddheshDeshpande,Amroz Siddiqui Ship Intrusion Detection using Custom Object Detection System with YOLO Algorithm January (2021).
- [5] S.Menaga, A. Priyadarshini , V.Subalakshmi, J. Priyadarshini , P.Velammal India ETEDM –(2021) Conference Proceedings .
- [6] Michael Christopher Xenya, CrensilKwayie, Kester Quist Aphesti(2019) Computational Modelling and Applications.
- [7] NaseerSabri, M. S. Salim, S. Fouad, S.AlweeAljunid, F.T AL-Dhief, C.B.MRashidi (2018).
- [8] SanamNarejo ,Bishwajeet Pandey ,DoriEsenarrovargas ,Ciro Rodriguez , and M. RizwanAnjum Weapon Detection Using YOLO V3 for Smart Surveillance System(2021).
- [9] P Vasuki, SesuPriya A, Soundarya R, A Smart Watchdog Intruder Detection System (2018).
- [10] GeunTae Kim, Yeonghun Lee, Kyoungchak Lee, HyungHwaKo,Development of Specific Area Intrusion Detection Systemusing YOLO in CCTV Video (2019).
- [11] Kaliappan Madasamy1 , VimalShanmuganathan1,Vijayalakshmi Kandasamy,MiYoung Lee, Manikandan



Thangadurai1, OSDDY: embedded system Based object surveillance detection system With small drone Using deepYOLO(2021).

Web References:

- <https://youtu.be/-gMKHuwfvjw>
- <https://youtu.be/kn7VagwwGLo>



INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 8.118



ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 **9940 572 462**  **6381 907 438**  **ijirset@gmail.com**



www.ijirset.com

Scan to save the contact details