THEFT DETECTION SYSTEM

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Abstract - Theft Detection System is a house safety technology that helps in alerting the owner of the house in case of robbery. With our busy lives, it is not possible to monitor it 24*7. Basically, this system is similar to a smart camera which will be able to detect any suspicious weapons or suspicious people entering the house. This system is capable of detecting people with inappropriate gestures or visiting at an unusual time and alerts the user via mail. This system is developed using the Image processing technique in which a dataset of weapons images is created first. Then, a model is built on the dataset using CNN which will be able to detect any weapons used during the robbery. This model is fed to the camera which will be able to alert the owner via mail. This system is further improved to also detect the people with suspicious face gestures like wearing masks that cover parts of the face. Based on the weapon detection and gestures of the guests visiting the guest, a score will be calculated. If the score is very high, an alarm sound is played which alerts the neighbors.

Index Terms - Convolutional Neural Network (CNN)

I. INTRODUCTION

Robberies, burglaries, and thefts continue to be a problem across the country. According to the National Crime Records Bureau (NCRB), there were 2,44,119 occurrences of robbery, theft, burglary, and dacoity at residential premises in 2017. This was an increase of more than 10% from 2016. The financial losses incurred because of these thefts and burglaries are enormous. Property stolen from residential premises in 2017 was valued at over Rs. 2065 crores, up 40% from Rs. 1,475 crores stolen the previous year. Dealing with is burglary a major part, and restoring the lost property is another headache for the victims of burglary like the cost of replacing the lost property or asset, the expenses associated with the litigations, etc., It has so much impact on the victims financially, emotionally, and mentally. It is seen in most cases that people who have been the victims of burglary have faced physiological issues for several years.

Our motive is to reduce this number of crimes and the impacts of burglary via an automated system that can detect these kinds of acts and immediately alert the owner as well the neighbors of the house whose house is about to be robbed. In particular, the idea is to equip security cameras at homes and shops with a system. This allows the owners of the residence to act quickly and alert concerned authority members. To achieve this, we need a model which is trained to detect any weapons along with the person or suspicious face of the person using image processing when trying to enter the house or a shop. Basically, our idea is to develop a machine learning model which is capable of identifying if any burglary is about to happen and if it is confirmed, the owner should be immediately informed.

II. LITERATURE SURVEY

TITLE: Automatic handgun detection alarm in videos using deep learning
AUTHOR: Roberto Olmos, Siham Tabik, Francisco Herrera
YEAR:2017

DESCRIPTION:
Current surveillance and control systems still require human supervision and intervention. This work presents a novel automatic handgun detection system in videos appropriate for both, surveillance and control purposes. We reformulate this detection problem into the problem of minimizing false positives and solve it by building the key training data-set guided by the results of a deep Convolutional Neural Networks (CNN) classifier, then assessing the best classification model under two approaches, the sliding window approach and region proposal approach. The most promising results are obtained by Faster R-CNN based model trained on our new database. The best detector shows a high potential even in low-quality youtube videos and provides satisfactory results as an automatic alarm system. Among 30 scenes, it successfully activates the alarm after five successive true positives in less than 0.2 seconds, in 27 scenes. We also define a new metric, Alarm Activation per Interval (AApI), to assess the performance of a detection model as an automatic detection system in videos.

TITLE: Automatic handgun detection alarm in videos using deep learning
AUTHOR: Francisco Pérez-Hernándeza, Siham Tabika, Alberto Lamasa, Roberto Olmosa, Hamido Fujitab, Francisco Herrera
YEAR:2020

DESCRIPTION:

This work focuses mainly on reducing the false positives by identifying the object which might be misunderstood as weapons by the automated systems used in security cameras. This work presented ODeBiC, a two-level deep learning-based system for detecting small items that can be handled identically. In surveillance footage, they employed the detection of small objects that could be mistaken for a firearm or a knife as a case study. They had created the Sohas weapon training database, which comprises six objects that can be mistaken for a weapon since they are regularly handled in the same way. Their experiment showed that the number of false positives has been reduced by more than 50% by using the ODeBiC methodology based on an aggregation method of OVO.

TITLE: Face Detection & Face Recognition Using Open Computer Vision Classifiers
AUTHOR: Lahiru Dinalankara
YEAR:2017

DESCRIPTION:

This is a model for face detection and face recognition using several classifiers available in Computer Vision Classifiers (OpenCV). These faces are detected using the Haar-cascade classifier and recognized using different applications like Eigenface, Fisherface, and Local binary pattern histogram (LBPH) algorithms. Apart from implementing this application, the project also compares the results obtained from these algorithms. Faces classifier objects are created using cv2.CascadeClassifier() and eye classifier objects are also created by using OpenCV XML files.

TITLE: SSDMNV2: A real-time DNN-based face mask detection system using a single-shot multi-box detector and MobileNetV2
AUTHOR: Preeti Nagrath, Rachna Jain, Agam Madan, Rohan Arora, Piyush Kataria, Jude Hemanth
YEAR:2021

DESCRIPTION:

This model aims at detecting the people who are not wearing masks and violating covid norms using the COVID-19 pandemic situation. In this model, the image dataset for both training and testing which contains images of people wearing the mask and not wearing the mask is developed. The OpenCV deep neural networks are used to train the model and obtained successful results. The MobilenetV2 image classifier was used to effectively classify images. The SSDMNV2 model is compared with several pre-existing models like LeNet – 5, AlexNet, and VGG-16. Comparison is done in terms of accuracy, F1scores, and average performance in
Frames per second(FPS), and it is found that SSDMNV2 excels in all the comparisons.

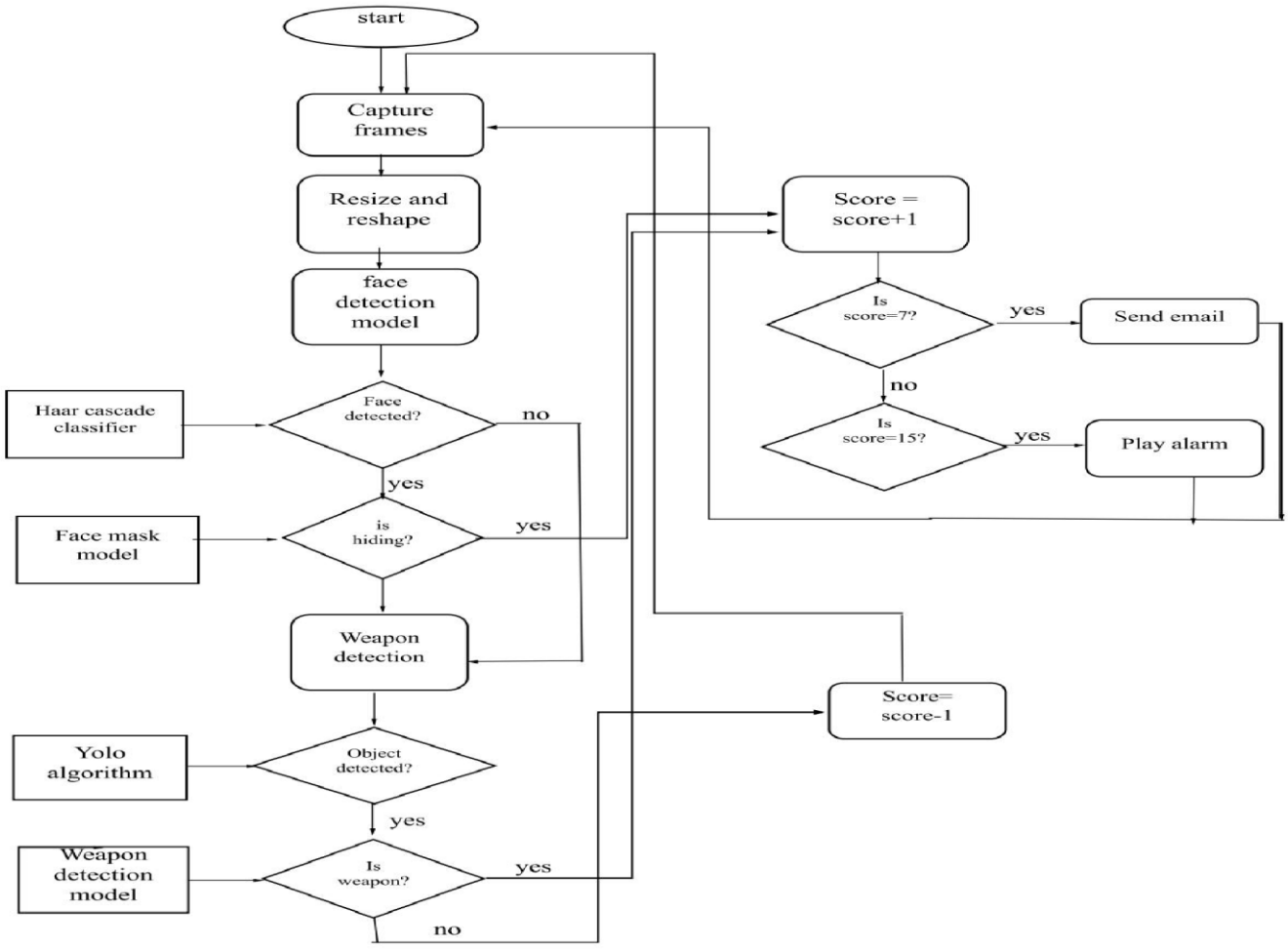
III. PROPOSED SYSTEM

The proposed solution is a security system that tries to analyze all the guests entering the house and predict if they are a threat to the house. The system continuously takes images of the scene visible to the camera and analyzes those images to rectify any suspicious guests or if the people entering the house are carrying any weapons.

Two image processing models are being used in the system:

1. Weapon detection: The system scans the images taken by the camera for the presence of any kind of weapon. It helps us identify if the people trying to enter the house are a threat to the house.

2. Face Detection: The system tries to identify if there is any person trying to enter the house, and if there is, then it analyses if the person is covering his face or not.



Workflow of the Theft Detection System.

IV. WORKING

The software system being built does the following:

- Takes the images captured by the camera as input and processes them to identify any weapon or suspicious person using a deep learning algorithm.
- If the presence of any one of them is detected, then a counter value will be incremented.
- Two threshold values are set for the counter based on experimentation.
- If the first threshold is reached, the owner is alerted via mail
- If the second threshold is reached, an alarm sound is played with the intensions of alerting the neighbors about the threat.

V. CONCLUSION

The work presented in this project is primarily focused on developing and implementing effective and useful observation frameworks for resolving security issues that can help decrease or prevent theft. The device will only take pictures if there is a human in the frame. As a result, the amount of data that will be processed is reduced. It will also save data storage by avoiding the capture of static photos that do not generally contain the object of interest. Users of this system do not need to worry about constantly monitoring the cameras; however, the system will alert them if anything suspicious goes around the house and allows them to act quickly before the property is lost. After completing the project, it can be integrated into a smart surveillance system, which would be extremely useful in detecting auto theft for security reasons.

This work can be further enhanced by trying to capture the facial expressions of the person trying to enter the house and reading those expressions. It is obvious that the person trying to break into the house will be tense and in hurry. These symptoms might produce effective results.

Also, the alert message which is sent via mail can be improved to send via other social media like WhatsApp as it is unlikely for someone to check their mail as frequently as they check their other social media accounts. This alert message can also include the image of the visitor which might help the owner identify if the visitor is a threat or not.

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