Security using Image Processing and Deep Convolutional Neural Networks

ABSTRACT

Safety has, for a long time, been one big thing everyone is concerned about. Security breach of private locations has become a threat that everyone intends to eliminate. The traditional security systems trigger alarms when they detect a security breach. However, the usage of image processing coupled with deep learning using convolutional neural networks for image identification and classification helps in identifying a breach in an enhanced fashion thereby increasing security furthermore to a great extent. This is due to its capability to extract complex features from the images using accurate and advanced face and body detection algorithms. The rate at which machine learning, especially deep learning, is transitioning is very high. The use of such technology in taking the existing systems and models to the next level would be a great step towards advancements in every field of science and technology. The same goes with computer vision. These two coupled and brought together to be used in the field of security results in achieving a lot more than what is imagined to be possible and this paper aims to do the same.

INTRODUCTION

Technology used in securing highly important places has changed a lot since the last few years and will continue to change in the coming years. Security is very important when it comes down to smart applications. The new and emerging concept of smart security offers a convenient, comfortable, and safe way for securing highly sensitive areas. Security systems used conventionally aim to protect a place from a breach by sending a notification in the form of a triggered alarm at the time of breach. However, the proposed security system offers many more benefits when compared to the conventional systems which are discussed in detail as we go further ahead into the implementation and working of this system.

EXISTING SYSTEM

▸ The traditional security systems trigger alarms when they detect a security breach. However, the usage of image processing coupled with deep learning using convolutional neural networks for image identification and classification helps in identifying a breach in an enhanced fashion thereby increasing security furthermore to a great extent.

DISADVANTAGES

▸ Security breach of private locations has become a threat that everyone intends to eliminate. The traditional security systems trigger alarms when they detect a security breach.

▸ The usage of image processing coupled with deep learning using convolutional neural networks for image identification and classification helps in identifying a breach in an enhanced fashion thereby increasing security furthermore to a great extent.

PROPOSED WORK

▸ The proposed security system is designed to increase efficiency and accuracy in security by using improvised and advanced object detection and highly efficient convolutional neural network models. The security system contains a microcontroller module which must be placed in the area to be monitored and would act as the core module of the system. This Module would only be used to capture all the data that it senses in the house and uses image processing and object detection algorithms to detect any breach.

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▸ The detected breach-data is then passed to the cloud for further processing as an input to the machine learning model which then outputs the properties of the image captured based on its previous training. The edge module placed in the area to be monitored contains the user log which is used to register users. Any changes to the system thereafter must be authorized only by the registered set of administrator users. The core module is connected to an external database which saves the timestamp of the breach as well as the breach-data including the video frames containing this information. Before doing so, the video frames with large difference between them are first processed using a first level image processing algorithm.

ADVANTAGES

- how computer vision can be used to detect human activity at the site and the use of deep convolutional neural networks to identify and match an image with a set of people authorized to visit a site. Thus, with a combination of both, the efficiency of the system is increased multifold.

CONLUSION

- Improvement to this system can be done using the OpenFace and the classifier it offers. OpenFace helps us to get the 128 measurements of the face and that is sent as an input to the classifier.

- Looking at all the measurements of the images which are measured before and the classifier will check with the closest match of the face. This can be further enhanced using the FaceNet model of Google which can produce better results. FaceNet was able to produce an accuracy of about 99.63%.

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