Car theft detection system using face detection

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Abstract

In the technological age, every aspect of life is driven by gadgets. From simple things like using an alarm clock to wake up in the morning to complex ideas like travelling at super human speeds using cars, we see the involvement of technology in every part of life. The influence of this electronic life has been so massive that without it, no one can even think of carrying their daily regime.

The use of cars in transportation is growing day by day. Almost every family owns a car. They have also become a symbol of one's wealth. Of course these valuables cannot be under surveillance 24/7. So here, we propose a system which can prevent car theft by monitoring the identity of the driver, by sending alert messages to the owner's cellphone whenever an unknown person is driving it. The system will use image processing to check if the person driving the car is the owner or not. If not, he will be informed of the same. If a theft is detected, the GPS tracker in the system will keep updating the owner about the location of his/her car.

The proposed system will be simple, easy to use, accurate and cost effective.

Keywords: face detection, occlusion detection, neural networks, Artificial Intelligence, haar feature, tracking gps, car theft

INTRODUCTION

Human belongings involving high end technology are often quite expensive. Thus, a demand for a security system is high in this age. In a decent system with proper security, access privileges should be granted only after accurate authentication. The privileged users have total control of the system which is where the concern comes in. Various techniques can be used to verify the authenticity such as encrypted passwords, keycodes, smartcards, bar codes and also biometric scanning. Encryption ensures that no actual data is stored anywhere in raw format which reduces the risk of someone hacking into the database. Biometric scanning is considered to be the best security measure because replicating human characteristics is almost impossible. Biometric security technologies include face detection, retinal scanning, fingerprints, iris scanning, etc.

Compared to other biometric security techniques, face recognition holds better because of the following advantages:

- Contact free process.

- Easy to implement using existing devices.
- The thief would not know that he is being captured on a cam. A camera can be stealthily installed anywhere
- Can be integrated with other platforms like android easily.

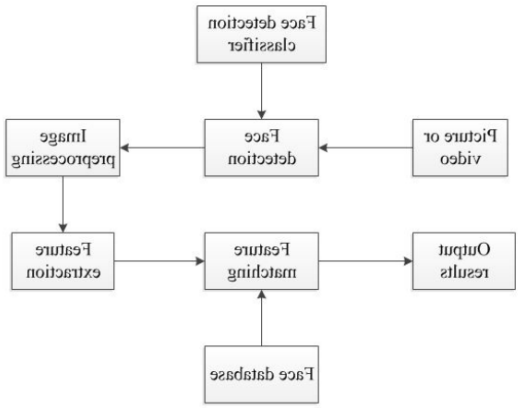
Whenever the system is on, the camera constantly captures the driver's seat using image processing and face recognition. The captured image is compared with the owner's image in the database and a response is generated. If the identity is different, the owner is alerted on his mobile app linked with the system, otherwise a message to indicate successful authentication is displayed on his mobile app. For an identified theft, the gps tracking is enabled and the real time position of the car is notified to the user.

Related Research

A. Papers based on faced recognition.

The paper published by Shaung Wang, Guanyu wen, Hua cai discusses about the research on face detection based on Haar feature. The paper proposes adaboost face detection algorithm which is most widely used with the advantages of high detection efficiency and faster speeds.

The adaboost face detection algorithm has two faces: training phase and detection phase. The training phase contains samples of face images which will train the adaboost classifier. The detection phase will contain the captured image and will test the classifier and produce the results.



Haar features: Also known was rectangular features, as shown in the figure below, simply describes features of human face. People proposed 5 basic haar feature templates composed of black and white rectangles.

Integral graph: Calculation of eigen values require a lot of time. So, Paul Viola proposed a method to calculate eigen values. The integral representation is as follows:

$$f'(x,y) = \int_0^y \int_0^x f(x',y')dx'dy'$$

Training Classifier: As proposed in the paper, it is generally believed that 19*19 pixels are minimum values in size in which face can be detected. The MIT database can

be used to train the classifier which contains more than 2000 face images.

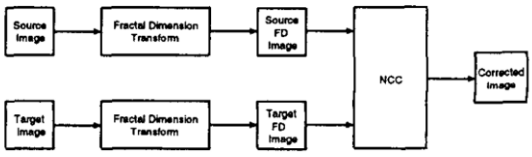
B. Papers based on image processing.

Background subtraction commonly and widely used technique for foreground mask. As the name suggests, background subtraction performs subtraction between current frame and background model.

The paper proposed by A.Z. Kouzani, F. He and K Sammut on Face image matching using fractal dimension considers the possibility of two images not being exactly identical. For example in car theft detection, the image of the owner stored in the database and the image captured of the owner later might not be EXACTLY the same.

Fractal dimension algorithm takes into account the roughness of images and similarity in them. It separates important classes of images and characterizes information which is not characterized by other texture analysis.

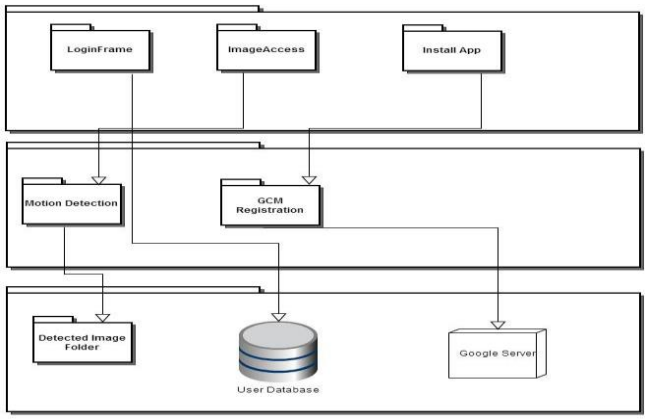
This paper proposes an algorithm for matching two faces as shown in the block diagram.



C. Papers/articles based on android development.

The paper published by Nishanthini. S, Abinaya. M and Dr.S.Malathi discusses about motion detection using Cauchy Distribution Model and Google Cloud Messaging Alert. The proposed system has high accuracy in detecting motion and capturing image. Webcams are inexpensive and very easy to setup in the required area.

Architecture:



The above architecture is divided into 3 tiers: Interface Layer, Application Layer and Technical Services Layer. User Interface layer comprises of the design modules for the video surveillance application for the user's Android Smartphone. The Application Layer consists of Motion Detection and GCM registration modules.

Google Cloud Messaging (GCM) is a service for Android which enables the user to send data from the server to the user's Smartphone that runs on Android Operating System. The aim of this module is to send a GCM Alert to user's Android Smartphone when a theft is detected. The main processes involved in cloud-to-device GCM are enabling GCM, sending a message and receiving a message.

Proposed system:

We propose a system to prevent car theft by implementing the following algorithm:

- Get training set of image / Get image of owner.
- Authenticate system with the image of owner.
- Get new test image
- Determine the authenticity of the new image image comparison algorithm.
- If driver is authenticated, authentication successful message will be displayed on owner's mobile.
- If not, an alert will be sent on the owner's mobile. The GPS tracker will be enabled and the owner can see the location of his car on his app.

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Conclusion:

In this paper, a system to solve car theft has been applied. The system can massively reduce this issue present in common man's life. It should be noted that this is one application for the system. The system can also be used in other places for security. It can be used to secure personal computers. Robots can use this technique to identify people. In college, this system can be applied to see if the right student is marking his attendance. Thus it can reduce theft as a whole.

References:

[1] Shuang Wang, Guanyu Wen, Hua Cai, "Research on Face detection based on fast Haar feature", 2017 10th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics.

[2] A. Z. Kouzani, F. He, K. Sammur, "Face image matching using Fractal Dimension", School of Engineering, Flinders University of SA

[3] Nishanthini. S, Abinaya M and Dr. S. Malathi, "Smart Video Surveillance System and Alert with Image Capturing using Android Smart Phones", 2014 International Conference in Circuit, Power and Computing Technologies [ICCPCT]

[4] Sifei Lui, Dong Yi, Zhen Lei, "Heterogeneous face image matching using multi-scale features".

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