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RESIDENTIAL SECURITY SYSTEM BASED ON FACIAL RECOGNITION

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***Abstract*— Two most critical universal rights and factors of life are Privacy and Security. Today facial recognition is one of the most popular technologies in the field of security. A human being can remember a finite number of faces. Whereas in a computer system, due to no limits on storage and hardware capability, they can be used where huge databases of facial records are needed.**

In recent years, there has been an increase in demand for better and more convenient household security; computers have come as our savior. Due to high computing power, large memory storages, and their precision, considerable development has been made in face recognition. This technology is ideally suited to overcome many security issues and attain flexibility to intelligent security control. However, these components come at a price that is too costly for people to invest in for a good performance that can guarantee results. Hence, after many years of research, state-of-the-art models have been developed which work on smaller IoT/mobile devices with high accuracy.

In this paper, we present an implementation of a facial recognition security system android app that works in real-time to identify residents of a residential complex. This system also keeps track of the entry details of individual residents, which can be easily requested in case of some criminal offense. To make it convenient for the residents, the whole system is made synchronous. Using the resident app, the residents can change their faces quickly whenever required from the comfort of their homes.

Keywords*— *face recognition, person identification, convolutional neural networks, machine learning, deep learning, biometrics, SSD, BlazeFace, MobileFaceNets, Euclidean Distance algorithm

I. INTRODUCTION

Since the last few years, there has been a boom in the research of facial recognition technology, mainly due to new heights achieved in the computing power field. Security has always been a significant concern, and many solutions have been developed to encounter those security problems. But each technology always had a drawback. Today, computers have achieved a remarkable feat by competing against the human-being face recognition ability. The performance of a computer is at par and sometimes even better due to modern technology. Out of the many biometric verification methods, face recognition has proven to be highly accurate while giving a seamless experience.

Every human can be easily identified by comparing the endless list of facial features. Automatic identification of a person in an authentication system is common nowadays. Usage of biometric parameters rather than conventional methods like pin, pattern, and passwords are more common due to their more restrictive nature and no stress of remembering access info. There are also many other biometric solutions like fingerprint scanning and voice identification, etc. Though face recognition outshines other biometric methods because it is hassle-free because no touching to get identified is required, and environmental conditions don't affect the system much. Hence, today it is one of the major technologies used in security systems worldwide in both personal and commercial security. Daily new innovations make this solution more secure and accurate. Though to date, there are many challenges that must be encountered, like the illumination of the environment, unstable facial characteristics like beard, glasses, etc. The other problem is the detection of the liveliness of a person, which can be a significant concern of risk. Also, the cost of the whole system for real-time facial recognition can be a huge challenge to adapt it in our daily life. But, due to recent advances in technology like mobile phones, specifically in high-performance hardware and excellent cameras at a much lower price, models for real-time facial recognition on these devices have been developed, which have reduced the cost drastically while increasing the robustness of the system.

In this paper we have described our methodology and algorithms used to develop a complete residential security system with an anti-spoofing system to make it accurate as well as convenient for the residents to have hassle-free secure entry. Also, a logging system is made which maintains records of residents entry which can help in investigation in case of any unusual activity.

II. LITERATURE REVIEW OF FACE RECOGNITION METHODS

Critical reviews of recent papers on face recognition have been carried out in this section.

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