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REAL TIME HIGH SECURED FACE RECOGNITION TECHNIQUE AND ALERTING SYSTEM

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Abstract:

With the rapid development of internet-of-things (IoT), face scrambling has been proposed for privacy protection during IoT-targeted image/video distribution. Consequently in these IoT applications, biometric verification needs to be carried out in the scrambled domain, presenting significant challenges in face recognition. Since face models become chaotic signals after scrambling/encryption, a typical solution is to utilize traditional data-driven face recognition algorithms. While chaotic pattern recognition is still a challenging task, in this paper we propose a new ensemble approach – Many-Kernel Random Discriminate Analysis (MK-RDA) to discover discriminative patterns from chaotic signals. We also incorporate a salience-aware strategy into the proposed ensemble method to handle chaotic facial patterns in the scrambled domain, where random selections of features are made on semantic components via salience modeling. In our experiments, the proposed MK-RDA was tested rigorously on three human face datasets: the ORL face dataset, the PIE face dataset and the PUBFIG wild face dataset. The experimental results successfully demonstrate that the proposed scheme can effectively handle chaotic signals and significantly improve the recognition accuracy, making our method a promising candidate for secure biometric verification in emerging IoT applications.

***Keywords**: GSM, Raspberry pi, camera.*

INTRODUCTION

With rapid developments in Internet-of-Things (IoT) technology, face recognition [1~4] has recently found a new use in web-based biometric verification, man-machine interaction, internet medical diagnosis, video conferencing, distance learning, visual surveillance, and psychological evaluation. In the context of mass internet technology, privacy [5~15] has become an issue of wide concern in web-based video streaming. As a result, face scrambling [5] is emerging as a practical technique to protect privacy legally during video distribution over the public internet. By scrambling faces detected in private videos, the privacy of subjects can be respected.

Compared with full encryption methods, face scrambling is a compromise choice because it does not really hide information, since unscrambling is usually achievable by simple manual tries even though we do not know all the parameters. It avoids exposing individual biometric faces without really hiding anything from surveillance video. As shown in Refs.[5~14], scrambling has recently become popular in the research field of visual surveillance, where privacy protection is needed as well as public security. Another advantage of face scrambling over encryption is its computing efficiency, and usually it is far simpler than complicated encryption algorithms. In many business cases such as public surveillance, the purpose is limited to only privacy protection from unintentional browsing of user data. Hence, full encryption becomes unnecessary in this context.

THE HARDWARE SYSTEM

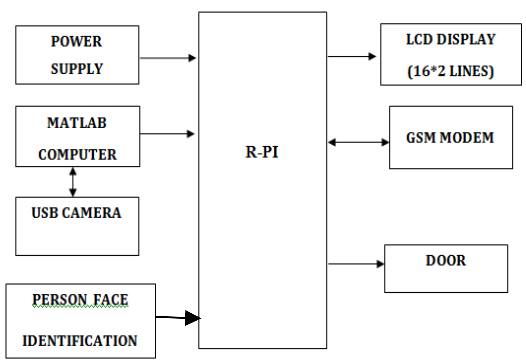

Fig.1.Block diagram

BOARD HARDWARE FEATURES

Micro Controller:

This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

Raspberry Pi :

The Raspberry Pi delivers 6 times the processing capacity of previous models. This second generation Raspberry Pi has an upgraded Broadcom BCM2836 processor, which is a powerful ARM Cortex-A7 based quad-core processor that runs at 900MHz. The board also features an increase in memory capacity to 1Gbyte.

Liquid-Crystal Display:

LCD is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

GSM:

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service. The network is structured into a number of discrete sections:

- Base Station Subsystem – the base stations and their controllers explained
- Network and Switching Subsystem – the part of the network most similar to a fixed network, sometimes just called the "core network"
- GPRS Core Network – the optional part which allows packet-based Internet connections
- Operations support system (OSS) – network maintenance

SM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response, and over-the-air encryption. However, GSM is vulnerable to different class of attacks, each of them aiming a different part of the network.

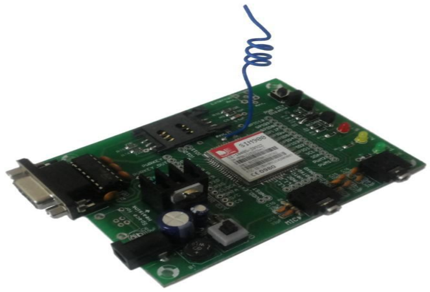

Fig .2: GSM Module

WEBCAM

"Webcam" refers to the technology generally; the first part of the term ("web-") is often replaced with a word describing what can be viewed with the camera, such as a net cam or street cam. Webcams are video capturing devices connected to computers or computer networks, often using USB or, if they connect to networks, Ethernet or Wi-Fi. They are well-known for low manufacturing costs and flexible applications. **Video capture** is the process of converting an analog video signal—such as that produced by a video camera or DVD player—to digital form. The resulting digital data are referred to as a digital video stream, or more often, simply video stream. This is in contrast with screen casting, in which previously digitized video is captured while displayed on a digital monitor. Webcams typically include a lens, an image sensor, and some support electronics. Various lenses are available, the most common being a plastic lens that can be screwed in and out to set the camera's focus. Fixed focus lenses, which have no provision for adjustment, are also available. Image sensors can be CMOS or CCD, the former being dominant for low-cost cameras, but CCD cameras do not necessarily outperform CMOS-based cameras in the low cost price range. Consumer webcams are usually VGA resolution with a frame rate of 30 frames per second. Higher resolutions, in mega pixels, are available and higher frame rates are starting to appear.

Fig.3: Webcam

The video capture process involves several processing steps. First the analog video signal is digitized by an analog-to-digital converter to produce a raw, digital data stream. In the case of composite video, the luminance and chrominance are then separated. Next, the chrominance is demodulated to produce color difference video data. At this point, the data may be modified so as to adjust brightness, contrast, saturation and hue. Finally, the data is transformed by a color space converter to generate data in conformance with any of several color space standards, such as RGB and YCbCr. Together, these steps constituted video decoding, because they "decode" an analog video format such as NTSC or PAL. Support electronics are present to read the image from the sensor and transmit it to the host computer. The camera pictured to the right, for example, uses a Sonix SN9C101 to transmit its image over USB. Some cameras - such as mobile phone cameras - use a CMOS sensor with supporting electronics.

FEATURES:

- Smallest wireless video & audio camera
- Wireless transmission and reception
- High sensitivity
- Easy installation & operation
- Easy to conceal
- Light weight
- Low power consumption
- Small size

SPECIFICATIONS:

- Output frequency: 900MHZ 1200MHZ
- Output power: 50mW 200mW
- Power supply: DC +6~12v
- Distance covered: 10m

Motor Driver:

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

Fig.4.Gear Motor

In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

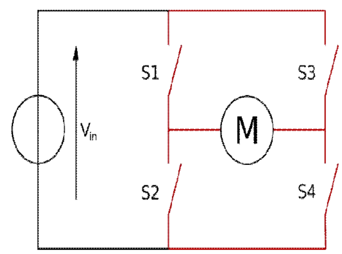

Fig.5. H-Bridge

CONCLUSION

In conclusion, we have identified a new challenge in scrambled face recognition originated from the need for biometric verification in emerging IoT applications, and developed a salience-aware face recognition scheme that can work with chaotic patterns in the scrambled domain. In our method, we conjectured that scrambled facial recognition could generate a new problem in which “many manifolds” need to be discovered for discriminating these chaotic signals, and we proposed a new ensemble approach – Many-Kernel Random Discriminant Analysis (MK-RDA) for scrambled face recognition. We also incorporated a salience-aware strategy into the proposed ensemble method to handle chaotic facial patterns in the scrambled domain, where random selection of features is biased towards semantic components via salience modelling. In our experiments, the proposed MK-RDA was tested rigorously on three standard human face datasets. The experimental results successfully validated that the proposed scheme can effectively handle chaotic signals and drastically improve the recognition accuracy, making our method a promising candidate for emerging IoT applications.

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