Digital Authentication and Authorization for Facial Recognition and Speech Detection System

(Biometrics System for Face Recognition and Voice Detection System)

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Abstract— The digital Authentication and Authorization of facial recognition and speech recognition system is an algorithm based which make Face Recognition and Speech Recognition for security purpose. Such Authentication of either face Recognition or Speech Recognition are used technically to make sure that the information of a particular Individual in the data base are corresponding to the person trying to be authenticated. In the case of Authorization, the process is giving the permission to the correspond database. In systems operating on multi-user concept, the system which users are allowed access to the system and what privileges of use (such as access to which file directories, hours of access, amount of allocated space for storing, then forth). These algorithms can be used in any security system which the person authentication is required. A security system which is developed using these two algorithms for identification of the person to-be authenticated using the face recognition algorithm and after proper authentication follows by the commands for the person using the speech recognition algorithm. The speech recognition algorithm basically uses the speech templates and therefore the face recognition algorithm uses the concept of Fourier Descriptor for the identification purpose. The proposed algorithms are simpler and faster as well as economical compared to previously reported algorithm. These algorithms are often easily implemented on DSP kits (Texas or Analog Devices) to develop an autonomous wireless security system. The algorithms which perform either the face recognition or speech recognition are developed and implemented on MATLAB 7.0.1. Engineers are working toward the creation of a voice-controlled device which may be integrated with the leading digital-assistants' voice technology; from household appliances and security devices, to thermostats and alarm systems

Keywords—component; (authentication and authorization for facial recognition and speech recognition system)

I. INTRODUCTION

The Speech Recognition & Face Recognition are two important aspect that have drawn the attention of many researchers in the recent time. The resulting terms of the Speech Recognition and Face Recognition modules are the most important steps of any humanoid robot that needs to get proper authentication of the person and giving authenticity before following any command or instruction. The proposed algorithms are often also utilized in different real time industrial applications. The facial recognition system is also a technology which is able to identifying or verifying a private from a digital image or a video frame from any source. There are several methods of which face recognition systems work, but generally, they work by comparing selected facial futures from given image with faces within a database. It is also described as a Biometric AI based application which will uniquely identify an individual by analyzing patterns supported the person's facial textures and shape. Facial recognition is usually used as access control in security systems and may be compared to other biometrics like fingerprint or eye iris recognition systems. It is widely adopted thanks to its contactless and non-invasive process. Recently, it's also become popular as a billboard identification and marketing tool. Other uses include advanced human-computer interaction, video surveillance, automatic indexing of images, and video database.

While in the speech recognition, the technology is something that has a better role to play in building expectations and predictions for what speech recognition could look like in our world. However, for all of recent technology's advancements, voice control has been a rather unsophisticated affair. What supposedly aims at simplifying our lives, instead, has historically been frustratingly clunky and zip quite a novelty. That is, until big data, deep learning, machine learning, and AI began to form their far more and more into the forefront of technology.

II. METHODOLOGY

A. Algorithm for Loading the Database into the Matrix: - Step

1: Zeros or Empty Vector is declared in accord with the

size of image data.

2: Reform the matrix into the vector with elements collected from the various subjects.
3: Transform the matrix in unsigned 8-bit numbers.
4: Provide each image a separate space into the dataset.

B. Algorithm for Face Recognition

Step 1: variance Mean and of the loaded dataset are made almost like by mean and variance ration technique. Mean and variance of one of the face images from the collections are treated as preferred mean and variance.

Step 2. Calculated mean is subtracted column by column from the matrix and now reshape the matrix into the vector whose features are collected column by column from the matrix.

Step 3: Correlation matrix is created by expending the collected vectors. Evaluation of Regression Coefficients is done by computing the Eigenvectors as of the parallel Eigenvalues of the correlation matrix.

Step 4: Eigen vectors calculated are reshaped into the matrix of the unique size. They are called Eigen faces.

Step 5: Normalization of orthogonal Eigen faces is completed by normalizing the vectors to create them orthonormal.

Step 6: Feature vectors are calculated known as Principal Components for each face image matrix the interior product of Eigen basis vectors and therefore the reshaped face image matrix

III. LITERATURE REVIEW

1. Waqar Mohsin in 2003 Worked on a project to detect and locate human faces in a color image. The design and implementation of the face detector in MATLAB that will detect human faces in an image similar to the training images. The algorithm used is sensitive to the color information in the image and will not work for a gray scale image.

2. Mwongela Waita in 2010 worked on a project Face Detection and Recognition on colour-image-based (2D) face recognition, rather than video-based (3D). Two decades. The reasons come from the necessity of automatic recognitions and surveillance systems, the interest in human sensory system on face recognition, and therefore the design of human-computer interface and access control.

3. M.Vineetha Sai in 2017 worked on a project face detection system with face recognition using two methods Eigenface method and Fisher face method. Facial image recognition Eigenface method is predicated on the reduction of face dimensional space using Principal Component Analysis (PCA) for countenance. A set of human faces is analysed using PCA to work out which 'variables' account for the variance of faces.

4. Rishav Chatterjee in 2018 worked on a project face recognition system using kit viola-jones algorithm to construct facial feature vector by down-sampling face components such as eyes, nose, mouth and whole face with different resolutions based on significance of face components.

5. Sneha Gupta in 2019 worked on Digital Image Processing on Face Recognition using PCA to convert a set of observation of possibly correlated

IV. APPLICATIONS

A. For Face Recognition

i) Social media

The social media platforms have embraced the face recognition application to expand their performance in order to attract a wider user base amidst stiff competition from different applications. The application grants video chat with others through a special filter for faces that modifies the look of users. While there is image augmenting applications such as face tune and Perfect.

ii) ID verification

The emerging use of facial recognition is the use of ID verification service. A-lot of companies and others are working in the market now to provide these services to banks, ICOs, and other e-businesses. In 2017, Time & Attendance company Clocked In released facial recognition as a form of attendance tracking for businesses and organizations looking to have a more automated system of keeping track of hours worked as well as for security and health and safety control.

iii) Face ID

Mobile phone manufactures recently introduced face ID as a biometric authentication successor to the Touch ID, a fingerprint-based system. Face ID has a facial recognition sensor that consists of two parts: one-part projects more than 30,000 infrared dots onto the user's face, and the

other part reads the pattern. The pattern is sent to a local "Secure Enclave" in the device's (CPU) to confirm a match with the phone owner's face.

B. For Speech Recognition

i In-car systems

Generally, a manual control input, for example the means of a finger control on the steering-wheel, enables the speech recognition system and this is signalled to the driver by an audio prompt.

ii. Medical documentation

In the health care sector, the concept of speech recognition can be implemented in receiver to which the aerial signal of the medical documentation process. The receiver end of which the aerial signal of the speech recognition is where the provider dictates into a speech-recognition engine, the recognized words are displayed as they are spoken, and the dictator is in charge of editing and signing off on the document

iii. Military (High-performance fighter aircraft)

Several attempts have been dedicated in the last decade to the verification and evaluation of speech recognition in fighter aircraft of particular note have been the US program in speech recognition for the advance fighter technology integration (AFTI)/F-16aircraft (F-16 VISAT), / aircraft, the program in France for mirage craft, and other programs in the UK dealing with a variety of aircraft platforms.

iv. Usage in education and daily life

For learning languages, speech recognition can be useful for learning a second language. It can teach proper pronunciation, in addition to help a person develop fluency with their speaking skills

v. Training air traffic controllers

For air traffic controllers (ATC) it is an excellent application for speech recognition systems of which many ATC training systems currently demand a person to act as a "pseudo-pilot", fetching in a voice dialog with the apprentice controller, which simulates the dialog that the controller would have to conduct with pilots in a real ATC

Words	Recognition Efficiency
JUMP UP	85%
MOVE RIGHT	80%
COME BACK	85%
GO FORWARD	75%

Fig.1 The results obtained after testification of the speech recognition system. Some simple command are been used

V. EXPERIMENT AND RESULTS

A. Tool For implementation: -

The MATLAB is the programming tool used to perform mathematical complex computations. The tool simplified C is used as the programming language. It has various inbuilt toolboxes and these toolboxes are mathematical toolbox, drag and drop based GUI, Image processing, Neural networks etc. It is generally used to implement algorithms, plotting graphs and design user interfaces. The tool has high graphics due to which it is used to simulate networks. It also has various versions by current MATLAB version is 2015. The processing elements are in the form of MATRIXs and various other languages like JAVA, PYTHON and FORTAN are used in MATLAB. The MATLAB default interface has following parts:

1. Command Window: - The command line, also called the Windows command line, command screen, or text interface, is a user interface that is navigated by typing commands at prompts, instead of using the mouse. Example is the Windows folder in a Windows command line is "C:\Windows>.

2. Work Space: -The workspace is the second part of MATLAB which is used to show allocation and deallocation of MATLAB variables. The workspace is divided into three parts. The first part is MATLAB variable, variable type and third part is variable value.

3. Command History: - The command history is the third part of MATLAB in which MATLAB commands are shown which are executed previously.

4. Current Folder Path: - The current Folder path shows that path of the folder in which MATLAB codes are saved

Current Folder Data: - The Current Folder Data shows that data which is in the folders whose path is given in Current Folder Path.

B. Comparison with Previous Approach: -

In the histograms the points where it shows 0 (zero) is the image number of those images which recently identified and vice-versa the points where it shows It is the recognition success point. My approach has shown a remarkable increase in the field of recognition rate from 79% to 92%. This shows that our approach provides more accurate results.

Subsets taken for testing	Recognition Rate	Testing Time (sec)
Subset 1	100%	0.7419
Subset 2	97.14%	0.8615
Subset 3	84%	0.8126
Subset 4	95%	0.9132
Subset 5	88%	0.9868
Mean	92.8%	0.8632

Fig.2. The results obtain after the comparison of several celebrities' pictures with the processing time shown in tabulation form.

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