ISSN 2395-1621

Multimodal Based Face Recogntion

#1Akshay Pardeshi, #2Saurabh Kasar, #3Suraj Singh, #4Shubham Bhosale, #5Prof. Sindhu M. R.

1akshaepardeshi31@gmail.com
2kasarsaurabh07@yahoo.com
3singhsuraj93@gmail.com
4shubhambhosale94@gmail.com

#1234Department Of Computer Engineering
#5Department Of Computer Engineering

GH Raisoni College of Engineering and Management, Pune, Maharashtra, India

ABSTRACT

Biometrics refers to a scientific discipline which involves automatic methods for recognizing people based on their physiological or behavioral characteristics. Biometric systems that use a single trait are called unimodal systems, whereas those that integrate two or more traits are referred to as multimodal biometric systems. A multimodal biometric system requires an scheme to fuse the information obtained from the individual modalities. In this paper, we have designed and developed a technique for multi-modal biometric recognition using feature level fusion. Initially we consider two data sets namely face and pattern. Using Eigen Faces we extract the features from the face and we will make use of N-Queens algorithm to determine a way in which a person thinks. This in turn will provide us with more security because the thinking pattern of every person is different.

Keywords: **Face Recognition, Multimodal, Eigen Faces, Pattern, N-Queens, Usability, Security, Authentication.**

ARTICLE INFO

Article History

Received :23rd January 2016

Received in revised form : 25th January 2016

Accepted : 27th January , 2016

Published online : 28th January 2016

I. INTRODUCTION

A multimodal biometric system requires an integration scheme to fuse the information obtained from the individual modalities. In existing system, people have made use palm-print combined with face recognition for security purpose. It was effective but also there were many drawbacks of it. It was a time consuming process. And also we can fool the security system by making clone palms of the victim and also we can make a mask that resembles the victim's face. Hence, this process system is not that effective and not fully secured. In this paper, we have designed and developed a technique for multimodal biometric recognition using feature level fusion. It will be a face recognition combined with pattern matching. Initially, we consider two data sets namely face recognition and pattern. Using Eigen Faces we extract the features from the face and we will make use of N-Queens algorithm to determine a way in which a person thinks. Biometric is the process of identifying of an individual in terms of their physiological and behavioral characteristics. Face, hand, eye, ear, skin, odor,dental and DNA are the general physiological which we have used. Voice, gait, keystroke, signature, mouse movement and pulse are the general behavioral characteristics which we have used; two or more biometric can be merged to enhance the accuracy of recognition. Though time taken in multimodal system is more compared to unimodal systems, still it is used in the systems where security is the chief concern. By using appropriate normalization technique and fusion technique we can achieve a high level of security multimodal biometric system.

II. LITERATURE SURVEY

A biometric system which relies only on a single biometric trait is often not able to meet the desired performance. In Multi-modal system more than one biometric traits are used to identify a person. The study of methods for uniquely recognizing based upon one or moreintrinsic physical or behavioural. The Multimodal biometric systems are providing identification and human security over last few decades. Due to this reason multimodal biometrics systems are adapted to many fields of applications [1]. In this paper, we will make use of multimodal biometric system in the field of security. We are making use of face recognition combined with pattern matching techniques to develop a security system. After researching, we got to know that the existing system biometric multimodal system is about face

recognition combined with palmprint [2]. So we are making use of pattern matching combined with face recognition as it is more efficient. Face is one of the most popular biometric characteristics, due to the fact that it is the easiest biometric characteristic to acquire non-intrusively, in various modalities. The drawback of biometric systems based on face is that, compared to other biometric characteristics, due to many variations in face appearance, accuracy achieved using face as a biometric characteristic is generally low.
Variations in face appearance are the effect of multiple factors such as face position, expression and aging [2]. In addition, human brain is too complex to understand, people can replicate a person's body part, such as, face, finger-print etc. but they cannot think like another person. Every person has a different thinking pattern. Hence we came up with the idea of combining face recognition with pattern matching.
Pattern matching process would help us in determining the behavior of a person. We are making use of N-Queens problem to determine a person's behavior, as to how that person reacts under given circumstances. To solve N-Queens problem we made use of dynamic [3] & backtracking algorithm [4].

III. PROPOSED SYSTEM

Face Detection

Face Detection is one of the integral part of this project. We are making use of the combined effect of face recognition system and pattern matching using Artificial Neural Networks. Face recognition is the first security check provided by this system.
For face recognition purpose we will be making use of three steps :

1. **Face Detection**

   a) Locate face in a given image.
   b) Separate it from the scene.
   c) Motion detecting and head tracking.

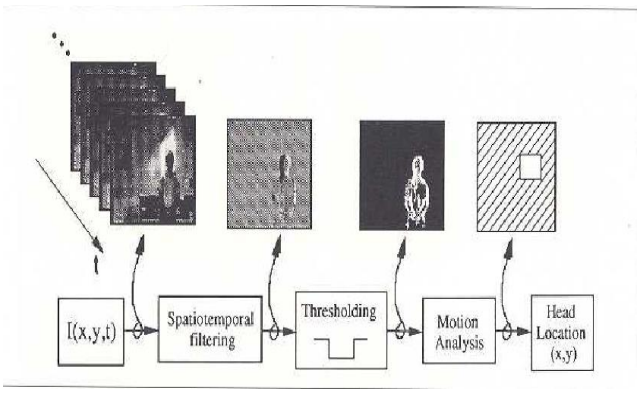
2. **Face Normalization**

   a)Adjustment(Expression, Rotation, Lighting, Scale, Head tilt).
   b)Eye location.

3. **Face Identification**

   a) Application of a face recognition algorithm.

IV.ARCHITECTURE USED FOR FACE RECOGNITION



1. Initially, the user provides the system with 4-5 number of images.
2. The system then overlaps these images and forms a rough pattern of a face.
3. Then it applies gray-scale effect to this pattern, which it got due to overlapping.
4. After applying gray-scale effect, it separates the edges of the image from the background. The image gets completely separated from the background as seen in the figure.
5. Then it crops the head portion of the image and separates it from the scene.
6. After that it makes use of Face Normalization technique to adjust the face location properly and to enhance the image using rotating, lightning, etc.
7. And an image of the face is obtained. This image can be used for the evaluation/recognition purpose later on.

V.PATTERN RECOGNITION

Pattern Recognition is the second stage of this system. In pattern recognition, we will make use of N-Queens algorithm to determine the way a person thinks. This would turn out to be a very effective system compared to the existing system of finger print combined with face recognition. We will make use of Artificial Neural Network(ANN) for the pattern recognition purpose.

Artificial Neural Network

Artificial neural network (ANN) is a machine learning approach that models human brain and consists of a number of artificial neurons.Neuron in ANNs tend to have fewer connections than biological neurons.Each neuron in ANN receives a number of inputs. An activation function is applied to these inputs which results in activation level of neuron (output value of the neuron).Knowledge about the learning task is given in the form of examples called training examples.An Artificial Neural Network is specified by:

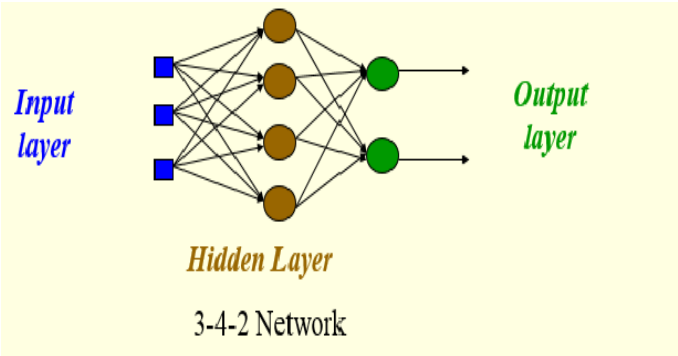
- **Neuron Model**: The information processing unit of the NN,
- **an architecture**: A set of neurons and links connecting neurons. Each link has a weight,

- **A learning algorithm**: Used for training the NN by modifying the weights in order to model a particular learning task correctly on the training examples.

The aim is to obtain a NN that is trained and generalizes well. It should behave correctly on new instances of the learning task.

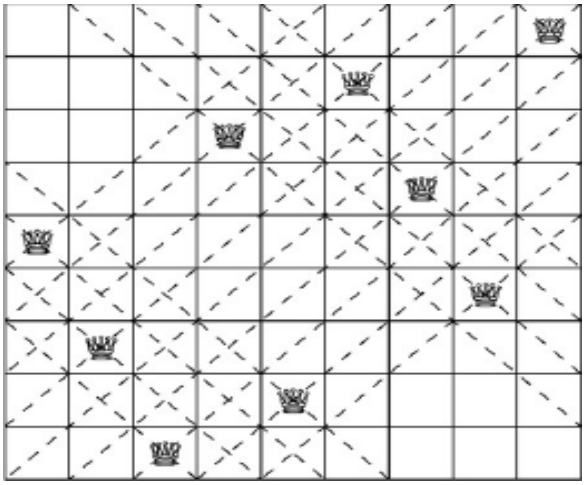
Multi-layer Feed Forward NN (FFNN)

FFNN is a more general network architecture, where there are hidden layers between input and output layers. Hidden nodes do not directly receive inputs nor send outputs to the external environment. FFNNs overcome the limitation of single-layer NN. They can handle non-linearly separable learning tasks.



N-QUEENS PROBLEM

The n-queens problem is to place n non-attacking queens on anxn board. This is a generalization of the problem of putting eight non-attacking queens on a chessboard, which was first posed in 1848 by M. Bezzel, a German chess player, in the Berliner Schachzeitun [1]. We know that a Queen can follow all the steps in a chess game except the steps of a horse. Queen can follow all the steps except that, i.e. it can move front, back and diagonals. So the objective of this problem is to place queens in such a way that no two queens attack each other vertically, horizontally or diagonally.



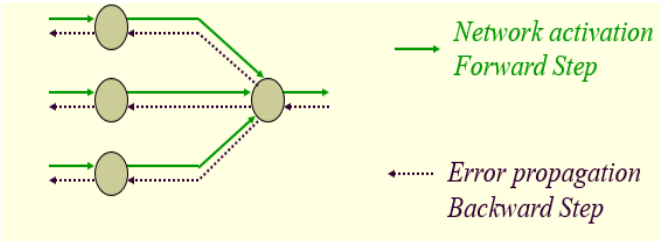
Over here we have taken an example of 9 queens problem. In the above problem, we have placed queens in such a way that no queen attacks each other. If we do place the queens properly then we will get a solved N-Queens problem. We will make use of backtracking algorithm to solve the N-Queens problem. We will make use of Backtracking algorithm to solve the N-Queens problem which is similar to Back Propagation algorithm of ANN.

TRAINING ALGORITHM:

BACK PROPAGATION

The Back propagation algorithm learns in the same way as single perceptron.It searches for weight values that minimize the total error of the network over the set of training examples (training set).Backpropagation consists of the repeated application of the following two passes:

- **Forward pass**: In this step, the network is activated on one example and the error of (each neuron of) the output layer is computed.
- **Backward pass**: in this step the network error is used for updating the weights. The error is propagated backwards from the output layer through the network layer by layer. This is done by recursively computing the local gradient of each neuron.



Back Propagation Training Algorithm

Back Propagation adjusts the weight of NN in order to minimize the network total mean squared error.

VI.CONCLUSION

We have presented a technique for multimodal biometric recognition using feature level fusion. Initially, we take data sets namely face and pattern. Using Eigen faces we extract the features from the face and the pattern features are extracted using n queens. The proposed technique is obtained with the help of evaluated with the help of performance metrics such as false acceptance rate, false rejection rate and accuracy. Finally, the comparative analysis shows the proposed fusion technique provides 92. This provides better results when compared to existing technique.

REFERENCES

1]. Multimodal Biometric System: A Surveyarun Jain[1], Assistant Professor[1],Sona Aggarwal[2], M.Tech.Student[2], Department Of Computer Sc. & Engineering, H.C.T.M, Kaithal, Haryana (India).

2]. Palmprint And Face Based Multimodal Recognition Using Pso Dependent Feature Level Fusion M. Arunkumar, Assistant Professor, S. Valarmathy, Professor & Head Department Of Electronics And Communication Engineering, Bannari Amman Institute Of Technology, Sathyamangalam.

3]. A Survey Of Known Results And Research Areas For N-Queens jordan Bell_, Brett Stevens School Of Mathematics And Statistics, Carleton University, 1125 Colonel By Drive, Ottawa, Ontario, K1S 5B6, Canada.

4]. A Dynamic Programming Solution To The N-Queens Problem Igor Rivin, NEC Research Institute, 4 Independence Way, Princeton, NJ 08540, USA, Raminzabih, Computer Science Department, Stanford Uniter.Sity, Stanford, CA 94305, USA.

