Face Recognition Using Artificial Neural Network

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Abstract. Recognition of people is big challenging problem. Face recognition system are used for more security of data, securely access control, preserve personal privacy, biometric authentication, human computer interaction and multimedia management. Implementation of face recognition system improves the execution and accuracy of face recognition so we have not need of carrying password or any ID. Face recognition system has implemented using various algorithms. There are various algorithms used for face recognition recent development of artificial neural network is very efficient tools for the face recognition. By comparing the essence like nose, mouth, eyes etc. of the new face recognition which are known to individual is done.

Keywords: *Neural network, face recognition, back propagation algorithm, PCA, biometric*

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1. Introduction

Face Recognition: face recognition is responsiblefor identifying the face are detected is known or unknown face. Face recognition is an interesting and capable utilization of recognition arrangement and picture inquiry.[1] Face processing is based on information about a users identical reject from pictures and computers can react according to. [2]

Difference between face detection and face recognition

Face detection Its main purpose to detect the object and locate the input model.

Face recognition To decide the input image or model is someone **known** or unknown is based upon the database of faces which is used to validate this input face.[5] So map detection output can be used as face recognition input and the output of face recognition is final decision either face is known or unknown face.[3][4]

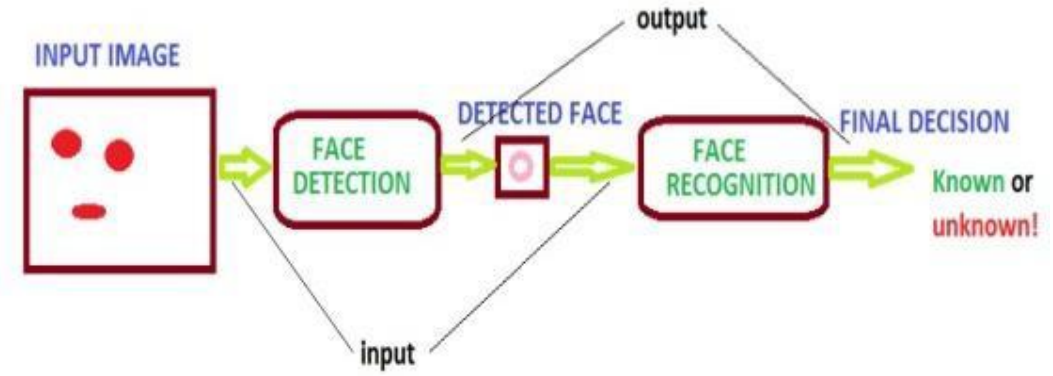

Fig1: process of Face Recognition.

Need for using biometric identification: Human identification is very basic requirement to recognize face could detect a stranger or identified for security purpose. In now days larger and further confused society. Growth of more electronic interactions it isn't simple. So it becomes even more meaningful to has an voltaic verification of a **person's** identification.[5]

Electronic verification was based on either they have to learn there password or they have their id card with themselves.The main issue is of voltaic verification is that are not very secure or forged by hackers. So ultimate solution of electronic verification is biometric using any physical aspect of the person to make a **positive** verification.[6]

Use of face recognition instead of

Biometric techniques

Traditional biometric techniques include fingerprints, RFID cards, voice recognition etc. It used in control and monitoring, in public place and in many application these biometrics are failed because they are:

- Time consuming
- Inefficient
- And costly.

We can't forcefully approach anyone to authenticate there thumb prints or eye scanned in camera or anything else.[5] Because of this reason we need a system which can be similar as human eye in some senses for verifification of a person. To fulfil these kind of need and using observation of human **activities**, it's a field of develop.[6][7]

2. Processing of Face Recognition

There are four stages for operate the biometric system:

Capture : During the enrolment a physical or behavioural sample **i**s captured by the **system**.
Extraction: Oneness of data is essence from the **sample** and figure is invent.
Comparison: Then figure is **compared** with the new sample. **Matching :**After that system will decides features are extract from new sample is matched from old one or not.[3][9][10]

3. Artificial Intelligence:

"The theory and development of computer system able to perform tasks normally requiring human intelligence, **such** as visual perception, speech recognition, decision- making and translation between languages."

Neural Network:

Semantic net is very woeful distribution manner which can be used predicting not only known data but also predict the **unknown** data. It works for both continuous as well as non continuous securable dataset. Neural network recycled in many fields like robotics, face recognition, voice identification, visual scenes, biometric etc.[11] Neural network is well known as "nodes". These knob are connected to each other by a connection link. Each related link has their join weight which contain knowledge about input signal. Every neuron have its own internal state. This internal state is known as "Activation or activity level neuron". A neuron can send only one signal at a time which can be transmitted to other neurons.[12]

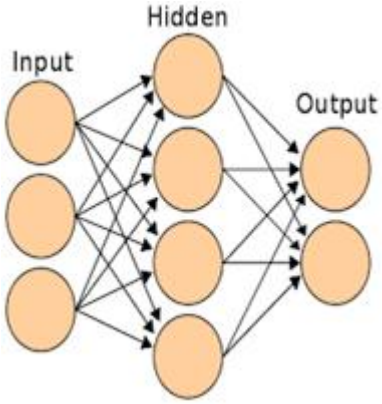

Fig2. Artificial neural network

Types of Artificial neural network:

There are five types of neural network. These are :

1. Single layer network
2. Multiple layer network
3. Single layer recurrent network
4. Multiple layer recurrent network
5. Single node with its own feedback

Single layer network: A single layer feed forward is formed by only single interconnection with various weights between input and output layer.
Multi layer feed forward network:A multi layer feed forward is formed by the interconnection of several layer. Hidden layer is formed between input layer and output layer. There are may be one or more hidden layers.
Single layer recurrent network: If feedback of the output of the processing element is use as the input of the processing element in the same layer.
Multi layer recurrent network: Feedback of the output of the processing element is use as the input of **multiple** layer use as the same or different layer. Recurrent network are feedback network with closed loop.
Single node with its own feedback: When output can be directed back as input to same or preceding nodes then it result in the formation of feedback network or node with its own feedback network.
Artificial neural network approaches for face detection:
Recently years, different **structures** and layout of artificial neural network are recycled for face recognition along with detection. Artificial neural network are used in face detection and recognition because neurons work on similar way that used in human brain.[11] There are different types of approaches:

Principal component analysis (PCA): Principal component analysis are used for finding some important data from huge amount of data. It used for choosing the minimum loss of the data for further processing of dataset.PCA is pertinent when you have achieve meed on number of variables and wish to develop a smaller number of artificial variable(called principal component) that will account for **most** of the variance in the observed variables. The principal may then be used as predictor or criterion variables in subsequent analysis.[12]
PCA is simple non-parametric method of extracting relavent information from confusing datasets. PCA algorithm computes the maximum number of adjustment in data with converting it from high dimensional to low dimensional image space. The **number** of neural network taken based on the number of different face images. Then each input images compared from images of dataset. If the image is known person then output is taken 1 otherwise output is taken 0. If found any error in current state then output of this layer is sent reverse to previous state for minimized error through the updates in weight.[13]

Radial basis function neural network : Hybrid approach of active shape mode(ASM) and principle component analysis algorithm are worn for radial basis function. In

radial basis function user used a camera to get facial image by using adabust and **then** applied histogram on it for improving the quality of mage. with the help of recognition and get output of the performance by applying P-RBF NNs and quantified performance. By **using** this improvement user reduced the un wanted parts of image.[14]

Back propogation network and radial basis function: By differentiate the characteristics of new **face** and the known faces recognition is done in this technique.[15] Extraction features are taking like eyes, mouth, nose, ears etc. feature algorithm as followed:

localized face is segregated into two equal parts as column wise.

For every row 'r' first black pixels taking aside as (x1,y1) and (x2,y2). Then calculate distance of these pixels as: Distance= sqrt((x2-x1)^2 +(y2-y1)^2)

By calculating distance of these pixels we obtained two non-zero set of eyes and mouth.

then calculate maximum distance foe every non-zero sets.

And the using maximum distance we calculate the following things:

left eyeball to right eyeball distance.
left mouth point to right mouth point gap. right eyeball to right mouth end point gap. gap from left eyeball.
right eye ball to left mouth end point gap.

And then these six values use as input of neural network recognizer.[16]

Conclusion

This review paper includes the study about the face recognition system based on the artificial neural network. In this paper discussed about different types of neural network and the different approaches used in face recognition system, test images and performance measure of face recognition using principal component analysis , radial basis function and back propagation network with radial basis function. Neural network used to detect that face is known or unknown. Combination of BPN and RBF network are discussed and compared with PCA . BPN and RBF is give more efficient results in compression with PCA.

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