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Review of face detection system using neural network

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Abstract :*Face detection is one of the most suitable applications for image processing and biometric programs. Artificial neural networks have been used in the many field like image processing, pattern recognition, sales forecasting, customer research and data validation. Face detection and recognition have become one of the most popular biometric techniques over the past few years. There is a lack of research literature that provides an overview of studies and research-related research of Artificial neural networks face detection. Therefore, this study includes a review of facial recognition studies as well systems based on various Artificial neural networks methods and algorithms.*

Keywords -*Artificial Neural Networks,biometric authentication,Face Detection, Face Recognitio, Unauthorized access.*

I. INTRODUCTION

Over the past few years, facial recognition has received significant attention and is considered one of the most successful applications in the field of image analysis[1].The human face representsintricate, versatile, visually appealing visual stimuli. Creating a computer model forfacial recognition is difficult[2]. Face detection can be considered as an important part of the facerecognition systems in terms of its ability to focus resources on components ofa picture containing a face. The process of finding a face in photos is complicated byvariations that exist on human faces such as: pose, saying, position, skincolor space the presence of glasses or facial hair, variation of camera benefit, lighting conditions, andimage correction[3].

Facial analysis was the field of researchpsychologists over the years. At the same time, progress on many domains such as: facesadoption, tracking and identity pattern recognition and image processingcontributes significantly to research on automated face recognition.Face detection must be done prior to the recognition process. This is done with proper extractiondetails of face-to-face analysis. Two stages of facial techniquesrepresentation and release of relevant information. And the output of the geometric element depends on himparameters of different features such as eyes, mouth and nose. At the same time, the face is the sameis represented as pixel compression values which should be properly processed in terms of appearanceapproaching (texture). The same members are compared with the face model using the correct metric[5].The study compared the performance of these representations in facial recognition.Therefore, depending on the complexity of the face recognition process, many programs based onhuman face detection was recently introduced as surveillance, digital systemsmonitoring, smart robots, notebook, PC cameras, digital cameras and 3G cell phones.

The efficiency of the applications is suchit is complex and difficult to meet the real-time requirements of a particular framework. In the pastFor a decade, many ways to improve facial recognition performance. At the same time, many book studies were focusedin research on facial recognition techniques Artificial neural networks (ANN) have been widely used in recent years in the field of imagingprocessing (compression, recognition and encryption) and pattern recognition. Lots of booksresearchers used different ANN formulations and face recognition and recognition modelsachieve better compression efficiency by: compression ratio (CR); rebuiltimage quality such as Peak Signal to Noise Ratio (PSNR); and specifies a square error (MSE). Fewa literature review that provides an overview of research related to facial recognition according to ANN.

Therefore, this study includes a study of literary studies related to facial recognition programs as wellmethods based on ANN.The whole paper is organized as follows: Section 2 includes the main steps for

finding a faceand recognition. Section 3 introduces lessons in textbooks related to face recognition programs based onANN. Finally section 4 completes the task.

II. FACE DETECTION AND RECOGNITION

The standard facial recognition program involves many steps: facial recognition, feature removal, andfacial recognition[6][7]. Face detection and recognition include manythe corresponding parts, each part being a complement to the other. It depends on each standard systempart can work individually. Face detection is a computer-based computer learning technologyalgorithms for allocating human faces to digital images.Face detection takes photos / video sequences as inserting and locating facial areas within these images[8].

This is done by separating the facial areas into the posterior regions of the face. Removal of facial featurefinds important positions (eye, mouth, nose and eye spaces) within the acquired face.Feature detection facilitates the creation of a facial circuit where the face is found aligned with the linkFramework to reduce the wide variation presented by various face scales and appearance. Thethe precise areas of the feature points that take a sample of the shape of the face provide input parametersby facial recognition. Other facial analysis functions: facial analysis , facial imagesand facial integration can be facilitated by the precise localization of facial features[6][7].

Face identification creates the final output of the complete face recognition system: ownership ofprovided face image. Depending on the general facial expressions and facial expressions based onin previous phases, the feature vector is generated on a given surface and compared to a database ofknown faces. If a close match is found, the algorithm returns the corresponding identity. The keythe problem with facial identification is the big difference between facial images from the same personcompared to those from different people. Therefore, it is important to choose the right facea separation process that can provide different positive strengths between different people. Faceidentification has a variety of applications. Because it provides a non-human access pointidentification, the face is used as an important biometric in safety applications[14][3].

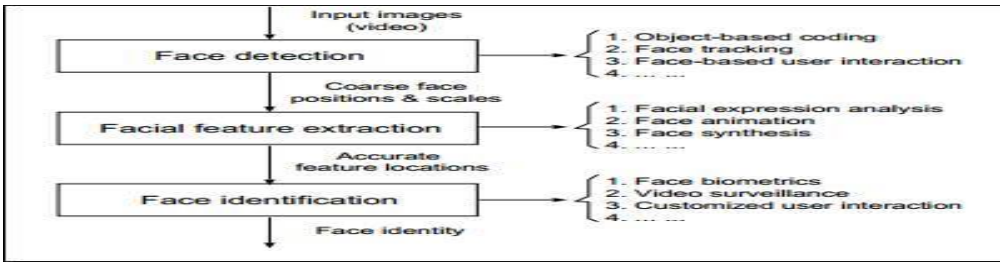


Figure 1. Framework of a face-recognition system[3]

The main steps of the face recognition program are shown in figure. A different image for face detectionwindows into two parts: one contains the face, and the other contains the background. The process is thisIt's difficult because the normal ones are in the middle of the face (they vary in age, skin color as wellfacial expressions); and varies: in light conditions, image attributes, nama geometry. The face detector will be able to detect the presence of any face under any lighting condition,in any domain

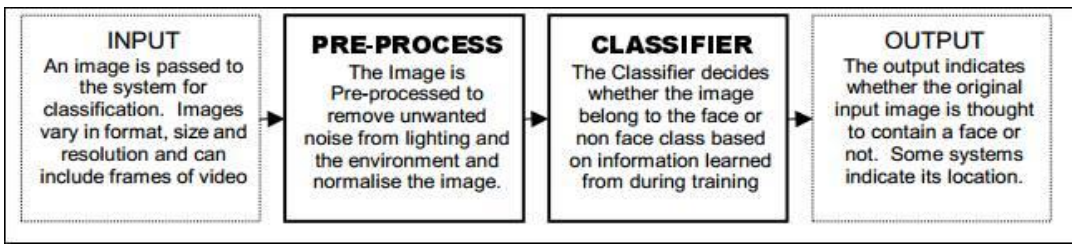


Figure 2. A general face detection system[3]

III. ARTIFICIAL NEURAL NETWORKS FOR FACE DETECTION

ANN can be used for face detection and facial recognition because these types canmimic the way neurons work in the human brain. This is the main reason for its role on the facerecognition. This study includes a review of research related to facial recognitionbased on ANN.

3.1.Retinal Connected Neural Network (RCNN)

A retinal-based facial recognition programa connected neural network (RCNN)[9][10] that scans small image windows to determine ifeach window contains a face. shows this approach. The system resolves among manynetworks to improve performance on a single network. They used the bootstrap algorithm as trainingIt

continues with training networks to add false discoveries to the training set. This removesthe difficult task of personally choosing examples of non-facial training, which should be chosen to expandall the space for non-facial images[9].

First, the pre-processing step, performed from and it is applied to aimage window. The window is then transferred to the neural network, which determineseven if the window contains a face. They used three training pictures. Test set collectedCMU: has 42 scanned images, newspaper photos, photos collected at WWW,and TV images (169 previews, and requires ANN to check 22,053,124 20 × 20pixel windows).
Test SetB has 23 images containing 155 faces (9,678,084 windows). TestSetC is similar to Test SetA, but contains images with complex backgrounds and externallyany face measurement scale for false detection: contains 65 images, 183 faces, and 51,368,003window. The detection rate for this method equals 79.6% of the surface over two large test sets as wella small number of false benefits.

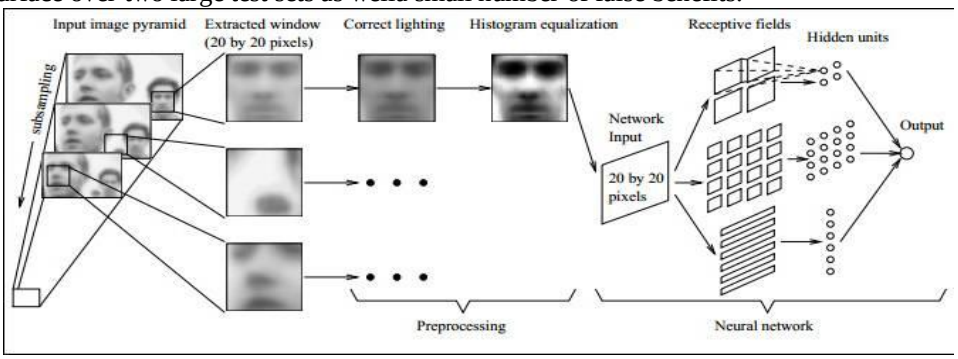
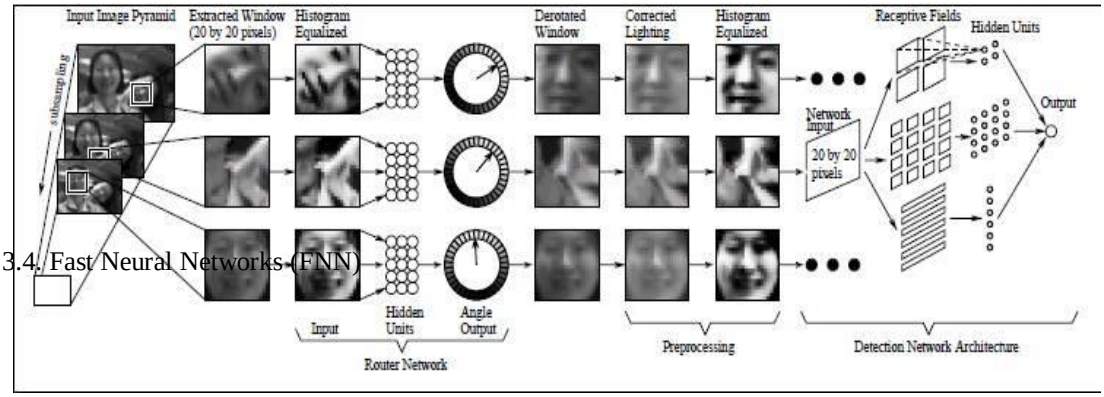


Figure 3. RCNN for face detection[9]

3.2.Rotation Invariant Neural Network (RINN)

A facial recognition system based on the neural network. Unlike similar systems that are limited to finding a straight, forward face, this program looks at the face at any rotation rate in the image plane. The RINN method. The system uses multiple networks the first is a "router" network that runs each input window to determine its position and then uses this information to configure one or more detector network windows. We present training methods for both types of networks. We also analyzed sensitivity in networks, and presented powerful results in a large set of tests. Finally, we present the first results of finding a rounded face outside an image plane, such as profiles and semi-profiles[12].



3.4. Fast Neural Networks (FNN)

Figure 4. RINN for face detection[12]

3.3.Polynomial Neural Network (PNN)

The proposed face detection method using a polynomial neural network (PNN). Local regions in multiple slide windows are divided by PNN into two categories (face-to-face) to find the human face in the image. PNN takes local image projection binomials from a feature subspace read by key object analysis (PCA) as input. Investigate the effect of PCA on facial or composite samples and facial-free samples[15].

3.4.Convolutional Neural Network (CNN)

Described an algorithm based on the laws of facial recognition associated with facial recognition using the convolutional neural network (CNN). The CNN method. The issue of subject freedom of study and interpretation, rotation, and scale measurement in facial recognition is addressed in this study[16].

3.5.Back Propagation Neural Networks (BPNN)

ANN to find the face of video surveillance. ANN is trained in multilayer back propagation neural networks (BPNN)[17]. Three face-to-face presentations (pixel, incomplete profile and eigenfaces) were taken. Three independent detectors are developed based on these three facial expressions.A proposed BPNN face detection system with a Gaussian composite model to differentiate the image according to skin color. In this way start with choosing the right skin and non-skinny ones. After that the elements are extracted from the coefficients of discrete cosine transform (DCT). Depending on the coefficients of the DCT feature in Cb and Cr color spaces, BPNN was used for training and facial detection. BPNN used to check whether the image included a face or not. The DCT feature of the facial feature representing a set of selected skin / skinless selections found in the Gaussian composite model was entered into BPNN to distinguish whether the original image covers the face or not[18].

3.6.Cascaded Neural Network

A rapid facial detector based on successive fragmentation of neural network ensembles to improve accuracy and efficiency. They have used a number of neural network planning methods to form a neural network ensemble. Each separation is unique in a small region in the space of the face pattern. These dividers are compatible to perform the acquisition function. After that, they set up neural network ensembles in the shopping area to reduce the total cost of face detection.

At this stage, simple and efficient ensembles used in the previous stages in the cascade are able to reject most of the facial patterns that do not have facial expressions by improving the effectiveness of the acquisition while maintaining the accuracy of the acquisition. Their results showed that the proposed neural-network ensembles improved the accuracy of detection compared to the traditional ANN. The way they work has reduced the cost of training and adoption by getting the adoption rate equal to 94%[14].

IV. CONCLUSION

This paper includes a review of the literature studies related to face recognition programs on the ANNs. Various layouts, method, programming language, processor and memory requirements, database of training / testing images and performance measurement of face recognition the system is used in each lesson. Each study has its own strengths and limitations.In future work, a face recognition system will be proposed based on the use of Pattern Net and Back neural network transmission (BPNN) with multiple hidden layers. Different network structures and BPNN and PatternNet parameter values will be accepted to specify PatternNet structures that will lead to excellent performance values for the face detection system.

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