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Survey on Different types of Neural Network Techniques to Classify Human Face

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Abstract:

Face Detection presents a challenging problem in field of image study and computer visualization but nowadays, Face Detection is important technique because it uses in various Application. There are many approaches to implement it. In this paper, an overview of some of the well-known methods in each of these categories is provided and some of the benefits and drawbacks of the schemes mentioned are examined. This paper also mentions some of the most recent algorithms developed for this purpose and attempts to give an idea of the state of the art of face recognition technology.

Keywords: Face Detection, Face Classification

INTRODUCTION

Face detection is a computer technology that determines location and sizes of human faces in digital images. It detects only faces and ignores other things such as trees, bodiesetc.Till now various techniques or approaches have been proposed like Detection as well as Classification. Face detection is used for two primary tasks.1) Identification: System compared the individual face with all other face which present in database.2) Verification: Face image of an unknown individual along with a claim of identity to find individual is who he/she claims to be.

FACE DETECTION TECHNIQUES

Face detection is the first step in automated face recognition. Face detection can be performed based on several cubes

Motion Facial/Head shape
Combination of this parameter

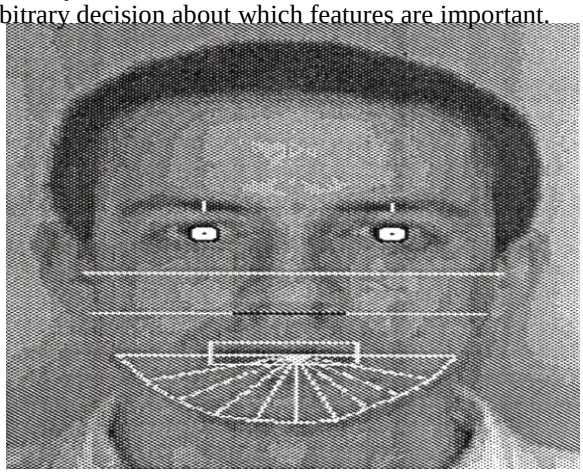
Most successful face detection algorithms are appearance base without using other cues. The processing is done as follows

An input image is scanned at all possible location and scales by sub window, Face detection is posed as classifying the pattern in the sub window as either face or no face.

1) Feature based: In this approaches first process the input image to identify extract (and measure) to distinguish facial feature, such as eyes, mouth and nose etc. And then compute the geometrical relationship among those facial points. In earlier days work on automated face classification was mostly based on these techniques [2].

Advantag**es** : the main advantages of` these technique is that extraction feature points precedes the analysis done for matching known individual image and high speed matching of face images

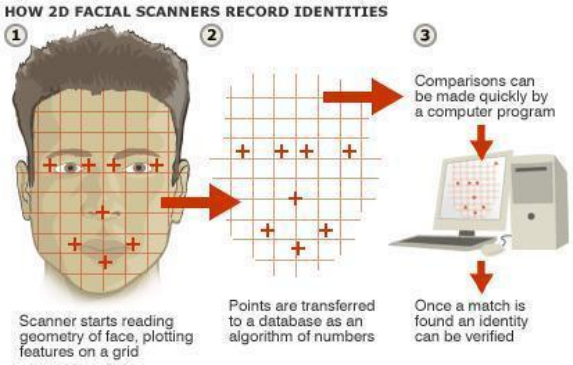
Disadvantages: the major disadvantage of these approaches is difficulty of automatic face detection because it has to make arbitrary decision about which features are important.



2) Artificial intelligence: These approaches use neural network machine learning techniques to detected faces. In these techniques principal components were extracted a neural network is used to reduce those components to five dimensions [2].Database is required for training and testing purpose .pictures are in variation, tilting or in rotation in database.

Advantage: Machine learning which helps machines to learn automatically in recognizing composite patterns and to take intellect decisions.

Disadvantage: Accuracy varies for various classifications using different algorithms.



3) Face Detection from video sequence: one of the major applications of face Detection is for security purpose it involves real time reorganization of faces from a sequence of image capture by video camera. These types of techniques consist of 3 steps[2]. First step is for detecting face, second is for tracking it and third for recognize face .most of these system choose a good few frames and then one of the technique to those frame in order to classify face.

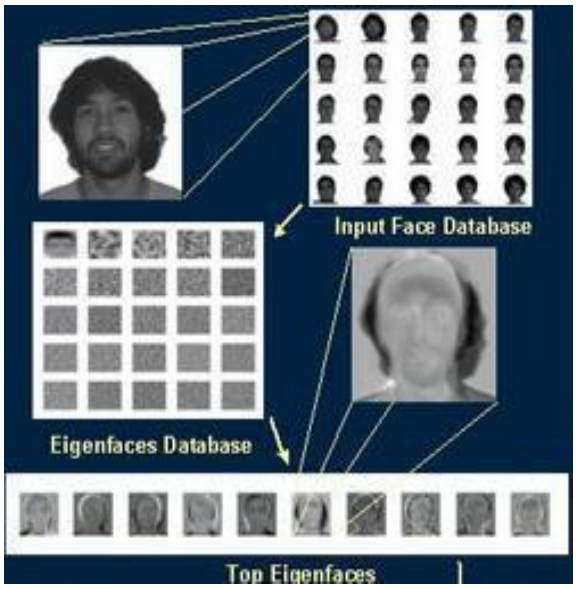
Advantage**:** system choose the frame with the best possible image and discard less satisfactory image. It can detect moving person's face.

Disadvantage**:** Dynamic face detection can suffered through many problems. Such as low quality images, cluttered .background (which complicate face detection) and more than one face in picture

4) Eigen faces: It was the first methods successfully used for face detection. Eigen faces is name given to set of Eigen vectors, when they are used in problem of human face classification. Eigenvectors are derived from covariance matrix of probability distribution over high dimensional vector space of face images[9]. Eigen faces themselves from a basis set of all images used in covariance matrix Classification can be achieved by comparing how faces are represented by basis sets[9].

Advantages**:** Ease of implementation, No knowledge of geometry or specific feature of the face required, little preprocessing work.

Disadvantages: Applicable only to front view, good performance under controlled background.



SUMMARY OF FACE DETECTION TECHNIQUES

Techniques	Merit	Demerit
Eigen face	Ease of implement' No knowledge of geometry or specific feature of the face required Little preprocessing work.	Sensitive head scale Applicable only to front view Good performance any under controlled background.
Featured Based	Faster than Eigen face Lower error rates Works will with different illumination and alignment.	Difficult of automatic face Detection It has to make arbitrary decision.
Artificial Intelligence	Machine learning helps to take intellectual decision.	Accuracy varies for different algorithm.
Video Sequence	It can detect moving persons face.	Low quality images.

FACE DETECTION USING NEURAL NETWORK

Face detection system is a computer vision and it automatically identifies a human face from database image. The face detection problem is challenging as it needs to account for all possible appearance Variation caused by change in illumination, Facial features, occlusions etc. In neural network algorithm works by applying one or more neural networks directly to portion of the input image and arbitrating their result. Each network is trained to output the presence or absence of a face. Following are some of the researches based on face detection.

1) Region based Fuzzy Neural Networks for Face Detection: in this fuzzy neural network is applied for face detection.in proposed system a preprocessed window face and non-face images are assigned by fuzzy membership degrees. Then these degrees are given as input to a neural network to be trained by back propagation training method. After training output value of the neural network will classify face and non-face region from the given window [4].Result shows that the proposed method can give more accurate result in comparison to conventional neural networks to detect the faces in images [4s].

2)Face Detection using Radial basis function Neural Networks with variance Spread Value: in this Radial basis function Neural Networks with variance Spread Value is used for face detection.in this system face region is located and extracted from the background and then fed into face recognition system for identification. Radial basis function is used for distinguish face a non-face region and other approaches are used to normalize the images [3].RBF neural network can be trained by using fast two stages training algorithm. Center and spread values of Radial basis function can be set for optimizing the output value of the neural network [3].Performance of this system is depend on detection rate, false acceptance and false rejection rate [3].

3) Face Detection using Combination of Neural Network and Ad a boost: This paper describes a grouping of two well-known algorithm first is ad boost and second one is neural network is used to detect face in static images which is useful to reduce the false positive drastically. For a extraction of face rapidly using integral image haar like features utilizes this method, method like a cascade Ad boost classifier is used to amplify the face detection speed[1].the cascade ad a boost produces high false

positive neural network which is used as the final classifier used to prove face or non-face[1].

4) Face Localization by Neural Networks trained with Eigen faces Feature Vectors and Zernike Moments: Face localization using neural network is presented in this technique. Neural network was

trained with two different type of feature parameters Vectors, Zernike moments and Eigen faces [9]. In all case, coordinate vectors of pixels neighbouring faces in images were used as aim vectors on the supervised training procedure. Thus, trained neural network provides on its output cover a coordinate's vector (ρ,θ) representing pixels neighbouring the face enclosed in treated image. This way to continue gives correct faces contours which are well tailored to their shapes [9]. Performances obtained for the both types of training characteristic parameters were recorded using a quantitative scale criterion.

Application of Face Detection

1)Passport control at terminals I n airports.
2)Participant identification in meetings.
3)System access control.
4)Scanning for criminal persons.

COMPARISON

Year	Topic	Author/Publication	Merit/Demerit
2001	Region based Fuzzy Neural Networks for Face Detection	Frank Chung Hoon Rhee, Hanyang University Ansan,Korea Changsu Lee iCash Co. Ltd	Merit: Using this method, more accuracy is Gained as compare to Conventional Neural Networks. Demerit : Requires more number of face images for test results.
2004	A method of Detecting Human Face region based on Generation and Selection of Kernel Features.	Junya Arakawa Yousun Kung Hiroshi Nagahashi Tokyo Institute Of Technology,Japan	Merit: Use of Kernel Features helps in achieving almost equal or better detection rate than SVM. Demerit: Problem of Kernel Feature is the absence of clear way for choosing parameters in Non-linear

			Projection.
2007	Face Localization by Neural Networks trained with Eigen faces Feature Vectors and Zernike Moments.	M. Saaidia M. Bedda University Evry Val d'Essonne,France	Merit: In this procedure, trained neural networks will provide precise face contours as their shapes. Demerit : 28% difference was recorded using Eigen vectors while mere 6% difference was recorded with Zernike moments.
2009	Face Detection using Radial basis function Neural Networks with variance Spread Value.	KhairulAzha A. Ahmad Nizam J. RidaAzriRamlee University Teknikal Malaysia Melaka.	Merits: Avoiding the use of Non-linear Optimization techniques, it is trained quickly using 2 Stage Training Algorithm. Demerit: The system can give better result if Overlapping factor is considered.
2010	Automatically Face Detection based on Neural Networks and Bayesian decision.	Xiaoning Liu GuohuaGeng School of Information Science and Technology,NorthewestUniversity,China.	Merit: Using skin colourfeature, human face can be separated out from complex background, fast and reliably. Demerit: From the test data, human face

			and non-face sample distribution is not a good normal distribution.
2011	Face Detection using Combination of Neural Network and Ad boost.	ZulhadiZakaria Shahrel A. Saundi School of Electrical and Electronics Engg. College. University Sains Malaysia.	Merit: Ad boost provides a good Detecting rate and even Neural Network shows good performance in Face Detection Techniques. Demerit: False detection rate is High using Adaboost and is also time consuming process.
2012	Machine Learning Techniques for Face Detection and Recognition.	E. Garcia Amaro M. Morales Sandoval Scientific and Technological Park of Tamaulipas,Mexico.	Merit: Machine Learning which helps machines to learn automatically in recognizing composite patterns and to take intellect decisions. Demerits: Accuracy varies for various classifications using different algorithms.
2013	A Novel approach for Face Detection using Artificial Neural Networks.	Md. Iqbal Quraishi Arindam Das PoulamiDey Kalyani Government College of Engg.,Nadia,India.	Merit: Power law transformation and Ripplet Transformation offer efficient and effective approach.

			Demerit: Requires more calculations.
2014	Improving Multiview Face Detection with multi-task Deep Convolutional Neural Networks.	Cha Zang Zhnegyou Zhang Microsoft Research.	Merit: Improve accuracy of Multitier Face Detection. Demerit: Yet Multi-task learning is not possible.

CONCLUSION

Face recognition is a challenging problem in the field of image analysis and computer vision that has received a great deal of attention over the last few years because of its many applications in various domains. Research has been conducted vigorously in this area for the past four decades or so, and though huge progress has been made, encouraging results have been obtained and current face recognition systems have reached a certain degree of maturity when operating under constrained conditions; however, they are far from achieving the ideal of being able to perform adequately in all the various situations that are commonly encountered by applications utilizing these techniques in practical life. The ultimate goal of researchers in this area is to enable computers to emulate the human vision system and, as has been aptly pointed out by Torres

"Strong and coordinated effort between the computer vision, signal processing, and psychophysics and neurosciences communities is needed" to attain this objective

REFERENCES

1)Face Detection Using Combination of Neural Network and Adaboos tZulhadi Zakaria Shahrel A. Suandi Intelligent Biometric Group School of Electrical and Electronics Engineering UniversitiSains Malaysia USM Engineering Campus 14300 NibongTebalPulau Pinang MALAYSIA Email: n4smy@yahoo.com, shahrel@eng.usm.my

2)A Survey of Face Recognition TechniquesRabia Jafri* and Hamid R. Arabnia*.

3)Face Detection Using Radial Basis Function Neural Networks With VarianceSpreadValueKhairulAzha A. AzizFaculty of Electronics and Computer Engineering UniversitiTeknikal Malaysia Melaka (UTeM).

8)Face detection PPT-KH Wong

9)Face localization by neural networks trained with Zernike moments and
Eigen faces feature vectors.

10) K. A. A. Aziz and S. S. Abdullah." Face Detection Using Radial
Basis Functions Neural Networks With Fixed Spread",
The Second

4)Region Based Fuzzy Neural Networks for Face DetectionFrank Chung-HoonRheeComputation Vision andFuzzy Systems LaboratoryDepartment of ElectronicEngineering,HanyangUniversityAnsan, KoreafrheeQfuzzy.hanyang.ac.r

5) Neural Networks for Classification: A SurveyGuoqiang Peter Zhang

6)artificial neural network and other methods of image classification.seetha,*i.v.muralikrishna,member,ieee ** b.l.deekshatulu,lifefellow,ieee,b.l.malleswari,nagaratna,p.h edge

7)a novel approach for face detection using artificial neural network.A NOVEL APPROACH FOR FACE DETECTION.
IqbalQuraishiDept.ofInformationTechnology
KalyaniGovtEngineeringCollegeKalyani, Nadia, India.iqbalqu@gmail.com
International Conference on Control, Instrumentation and Mechatronic Engineering (CIM09) Malacca, Malaysia, June 2-3, 2009.

11)H. A. Rowley, S. Baluja, and T. Kanade. "Neural Network-BasedFace Detection", IEEE Trans. Pattern
Analysis and Machine
Intelligence, vol. 20, no. 1, pp. 23-38. 1998.

12) R. C. Gonzalez, R. E. Woods, and S. L. Eddins, "Digital Image
Processing Using Matlab", Pearson Education, Inc,

Prentice
Hall 2004.

13) E. Hjelmas, and B. K. Low, "Face Detection: A Survey" Academic
Press, 2001.

14) S. S. Abdullah, M. M. Idris, "A Short Course In Artificial Neural
Networks" 2008.

15) CBCL Face Database #1 MIT Center For Biological

16) T. Mikami, M. Wada, "Example-based Face Detection Using Independent Component Analysis and RBF Network", SICE Annual
Conference in Fukui, August 4-6, 2003.

17) S. A. Nazeer, N. Omar, K. F. Jumari, M. Khalid, "Face detection
using Artificial Neural Network Approach," Proceedings of the First Asia International Conference on Modeling & Simulation (AMS'07), 2007.

18) F. Girosi and T. Poggio 1990, "Networks and the best approximation
property". *Biological Cybernetics*, 3, 169-176.

19) M. J. Er, S. Wu, J. Lu, and H. L. Toh, Face Recognition With Radial
Basis Function (RBF) Neural Networks, IEEE TRANSACTIONS ON
NEURAL NETWORKS, VOL. 13, NO. 3, MAY,2002