

FACE DETECTION USING FEED FORWARD NEURAL NETWORK IN MATLAB

Lalita Gurjar¹, Nidhish Tiwari²

¹Research Scholar at jagan-nath university

²Associate Professor at JNIT,

Abstract

This paper used Gabor filter feature for face detection. we design filters for elicitation(extracting) facial feature from the local image using individualistic property of spatial locality and orientation individualistic of the Gabor filter. The vector based property of Gabor filter is used as input of classifier, which is FFNN(feed forward neural network) on a reduced feature subspace learned by an approach simpler than PCA. Large amount of calculation is required due to vector input having large values. so, we delete some rows and columns in order to reduce size of matrix to 1/3 of actual size. In spite of using PCA method save more time but it's not the best way. Face detection & recognition technology is used in various fields like security system, video conferencing and identification .face distingustion is recently implemented in software. The aim of this paper is to develop a classifier based multi-layer perceptron neural network for face detection This face detection system starts with image preprocessing and then the output image is trained using Back propagation algorithm. Back propagation network learns by training the inputs, calculating the error between the real output and target output, and propagates back the error to the network to modify the weights until the desired output is obtained.

keyword - face detection, Gabor filter, feed forward neural network classifier, Multilayer perceptron.

1. INTRODUCTION

The objective of the paper is to sort out the problem of face detection using Artificial neural networks. Here we will be using concept of neural network in order to detect upright, tilted & non-frontal faces in crowded gray scale images, whose outputs are rotated continuously to give the final output .From computer point of view it is quite difficult for object detection so this technique will be going to solve out the problem.The present generations is craving for new innovations in the field of face detection in order to minimize processing time.so we are coming out with a new methodology filtering called as gabor filter.

1.1 Face Detection Approaches-An Overview

Hjelmas and low conducted a survey on face detection techniques, and identified two broad categories[1]-

1.1.1 Feature-Based Approach

Extraction of low-level visual features(edges, brightness, color movement, etc.)from pixel properties (position, color ,etc)Using our knowledge of the face geometry, we abstract low-level features into high-level face features(mound, nose, eyes, etc.)[3].Main techniques-

1. Feature searching: we look for face feature and its relative placement in order to detect a face.
2. Constellation analysis: Facial feature are group into face-like constellation using more robust face models based on statistical analyses.
3. Active Shape Models: Techniques where the face feature are located with active shapes i.e. models that if released near a feature interact with the local image and modify themselves to take the shape of the feature[2].

1.1.2 Image-Based Approach

Reformulation of the face detection problem as a pattern recognition problem. No direct knowledge about faces is given(face knowledge), but it is inferred from examples[4].Main techniques-

1. Linear Subspace Methods: Principal Component Analysis (PCA).Linear Discriminant Analysis(LDA).
2. Statistical Approaches: Information-theory based system, support vector machines.
3. Neural Network: Neural network based techniques are popular for pattern recognition and are inspired by the human brain.

2. PREPROCESSING

In preprocessing we find out the skin pixel from input image by passing the through skin color filter. The first step in a skin color filter to change the image from RGB to Gray scale image.[5]

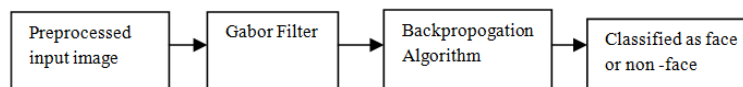


Figure 1 Face Detection Block Diagram

3. Gabor Filter

In image processing a **Gabor filter**, named after Dennis Gabor is a linear filter used for face detection. Frequency and orientation representations of Gabor filters are similar to those of the human visual system. In the spatial domain, a 2D Gabor filter is a Gaussian kernel function modulated by a sinusoidal plane wave. Gabor filter extracts the information from preprocessed image by using a 8 orientation and 5 resolutions bank of filter[6].

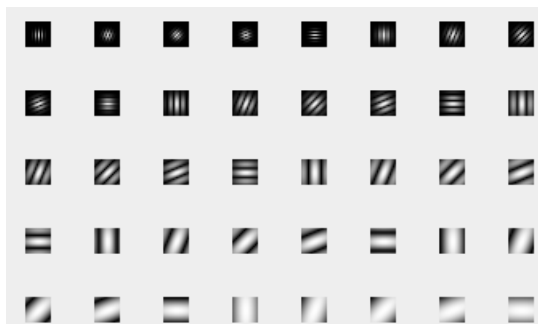


Figure 2 Gabor filters of size 16x16 by 8 orientation and 5 resolutions.

4. TRAINING METHODOLOGY

The algorithm training of feed propagation in universal with MLP. Open problem are faced by feed forward algorithm whereas its training shows a remarkable variability. But in most cases, it improves the efficiency of computation & inhabits heavy, tailed nature of training by using rapid-start method. Due to its ability & sobriety MLP was chosen for proposed system. There is suitable since we have pairs of input and outputs available, satisfying the supervised rule. Classical feed forward algorithm is used for training the network. Face detection is not a complicated venture for human beings, Gabor filters which are agitated biologically is exactly suited for this problem [6].

System is neural network can be implemented in four main areas;

- 4.1 Creation of Database [searching of facial features by gabor filters]
- 4.2 Initialization of Network [formation & conformation of a neural network]
- 4.3 Training [preference of training data & parameters]
- 4.4 Classification [scanning images to locate face]

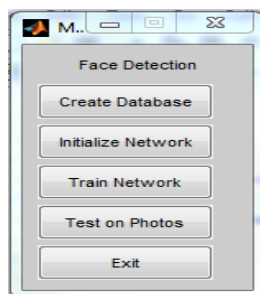


Figure 3

4.1 Creation database- pre-processing technique applied to system which is already provided with set of two classes “non ace” & “face” images of size 27x18. It also include original images, mirror images & left –right mirror image which dilate face information where as non-face information dilated by up-down mirror images. Gabor filter is used to create information for face & non-face images, which are extracted from the facial feature of images.

4.2 Initialization of neural network- The property of custom network set as desired network creating it & many such properties are set to compose the number of network sub- objects(include in-put layer, outputs, target biases & weights) & the way they are connected.

4.3 Training the neural network- Non-face & "face" both classes are ready to train the neural network on them to fed into the system, training occur according to training parameters shown with their default rules;-

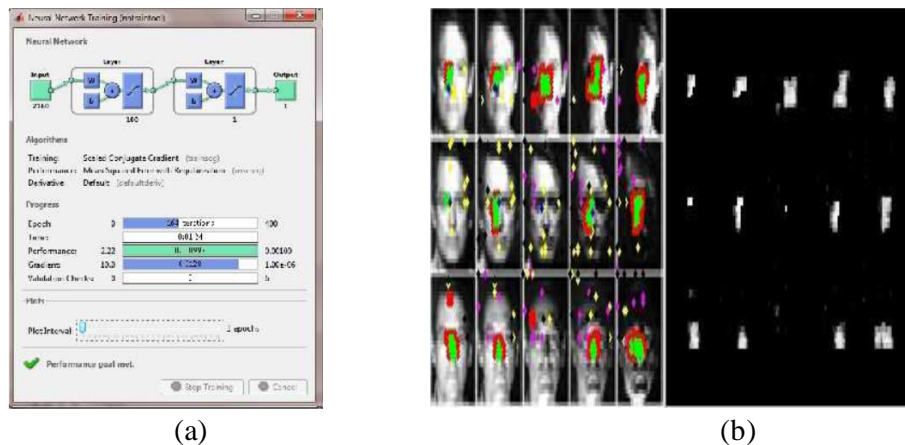


Figure 4 Training of neural network

4.4 Classification- For the checking of an image that it contains face or not, trained network is used in which the image is firstly modified into grey scale for classification of image, a new image is offered to the network the image is splitted into windows that are individually offered to the network to perform classification windows verdict to contain a face, outlined with a red bounding box of size 127x127 & the images will be displayed on completion.[6]



Figure 5 Draw a rectangle for each point



Figure 6 Final Result will be like this

5. CONCLUSION

In this we presented an approach for face detection which increase the accuracy of face detection and minimizes the total time for detection. The creator of face detection algorithms and system should know the relevant psychophysics and neuropsychological studies for implementation point of view.

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