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AGE RANK DETECTION USING GENERALIZED FEED FORWARD (GFF) NEURAL NETWORK

Ms. Tejashri D.Wankhade

Student of HVPM'S College of Engineering and Technology Amravati (India)

Mr.Vijay L. Agrawal

Associate Professor in Dept. (Electronic and Telecommunication) of HVPM'S

College of Engineering and Technology (India)

Abstract— In this paper a new classification algorithm is proposed for the Classification of Age rank both in male and female. In order to develop algorithm 125 camera captured images of seven male and seven female in different angles images. With a view to extract features from the Captured images after image processing, an algorithm proposes (FFT) Fast Fourier Transform coefficients. The Efficient classifiers based on Generalized feed forward (GFF) Neural Network. A separate Cross-Validation dataset is used for proper evaluation of the proposed classification algorithm with respect to important performance measures, such as MSE and classification accuracy. The Average Classification Accuracy of GFF Neural Network comprising of one hidden layers with 2 PE's organized in a typical topology is found to be superior for Training . Finally, optimal algorithm has been developed on the basis of the best classifier performance. The algorithm will provide an effective alternative to traditional method of Age rank detection using captured image analysis for deciding the age in male and female.

Keywords— *Matlab, NeuroSolution ,Microsoft excel, camera captured images, GFF networks, learning rules.*

INTRODUCTION

Face images convey a significant amount of knowledge including information about the identity, emotional state, ethnic origin, gender, age, and head orientation of a person shown in a face image. This type of information plays a significant role during face-to-face communication between humans . Current trends in information technology dictate the improvement of the interaction between humans and machines, in an attempt to upgrade the accessibility of computer systems. As part of this effort, many researchers have recently directed their research effort toward age estimation problem. Age estimation is the determination of a person's age based on biometric features . Although age estimation can be accomplished using different biometric traits, this research focus on facial age estimation that relies on biometric features extracted from a person's face. The process of age determination could figure in a variety of applications ranging from age-based access control, age adaptive human machine interaction., age invariant person identification and data mining and organization .

In additional to problems encountered in other typical face image interpretation tasks such as face detection, face recognition, expression and gender recognition, age estimation displays additional unique challenges due to the complex variations, including cosmetics usage, personal specialties, living conditions, gender and ethnic differences.

In this research, we try to prove that computer can estimate/classify human age according to features extracted from human facial image using Artificial Neural Network (ANN). Artificial neural networks (ANN) are parallel computational models, comprising closely interconnected adaptive processing units. The important characteristic of neural networks is their adaptive nature, where 'learning by example replaces programming'. This feature makes the ANN techniques very appealing in application domains for solving highly nonlinear phenomena. ANN have been applied successfully to many application. Most of these applications are based on statistical estimation, optimization and control theory such as speech recognition, image analysis and adaptive control. A Multi-layer neural network can approximate any smooth, measurable function between input and output vectors by selecting a suitable set of connecting weight and transfer functions.

In our research, we devote our study to produce a system which is capable for estimating the age of a person as reliably as humans. To achieve this goal we follow a research methodology that consists of the following steps: First we capture a real human face image from people around (friends and family). Second we use matlab tool to locate and extract the face features. Third we preprocess and prepare the

data for ANN training. Finally we apply our experiments and analyze the results.

RESEARCH METHODOLOGY

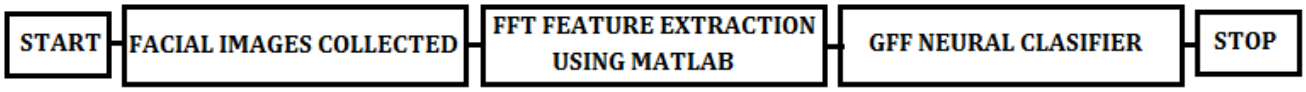

Figure2.1 Methodology of work

It is proposed to study age rank Recognition Using Neural Network Approaches.. Data acquisition for the proposed classifier designed for the Recognition of Human Age shall be in the form of facial images. Image data will be Collected from the different- different Faces .The most important un correlated features as well as coefficient from the images will be extracted .In order to extract features, statistical techniques, image processing techniques, transformed domain will be used.

NEURAL NETWORKS

Following Neural Networks are tested:
Feed-Forward Neural Networks

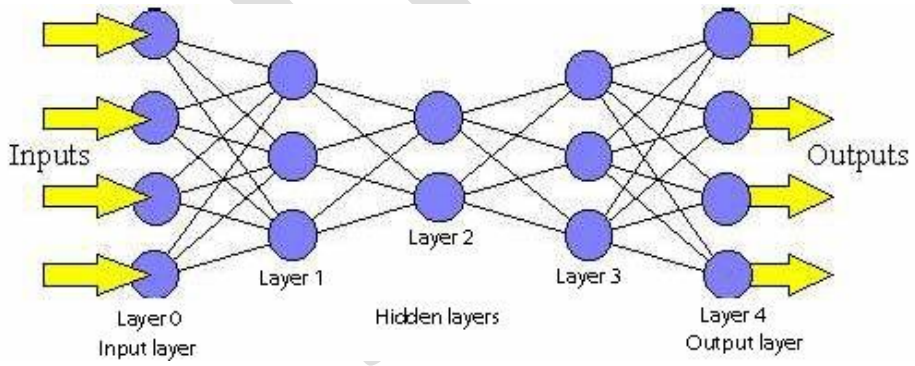

Figure 3.1 feed-forward network.

Feed-forward networks have the following characteristics:

1. Perceptrons are arranged in layers, with the first layer taking in inputs and the last layer producing outputs. The middle layers have no connection with the external world, and hence are called hidden layers.

2. Each perceptron in one layer is connected to every perceptron on the next layer. Hence information is constantly "fed forward" from one layer to the next., and this explains why these networks are called feed-forward networks.

3. There is no connection among perceptrons in the same layer.

A single perceptron can classify points into two regions that are linearly separable. Now let us extend the discussion into the separation of points into two regions that are not linearly separable. Consider the following network:

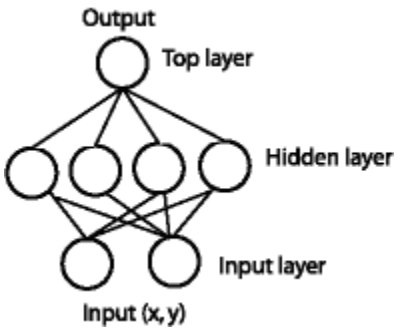

Figure. 3.2 A feed-forward network with one hidden layer.

The same (x, y) is fed into the network through the perceptrons in the input layer. With four perceptrons that are independent of each other in the hidden layer, the point is classified into 4 pairs of linearly separable regions, each of which has a unique line separating the region.

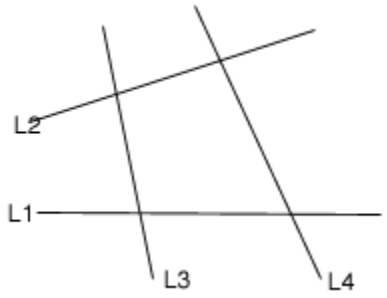

Figure 3.3 lines each dividing the plane into 2 linearly separable regions.

The top perceptron performs logical operations on the outputs of the hidden layers so that the whole network classifies input points in 2 regions that might not be linearly separable. For instance, using the AND operator on these four outputs, one gets the intersection of the 4 regions that forms the center region.

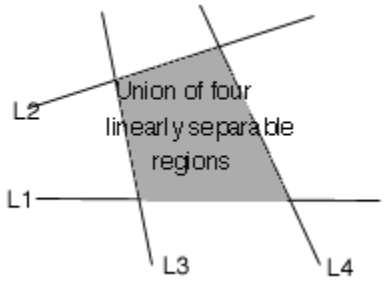

Figure3.4 Intersection of 4 linearly separable regions forms the center region.

By varying the number of nodes in the hidden layer, the number of layers, and the number of input and output nodes, one can classification of points in arbitrary dimension into an arbitrary number of groups. Hence feed-forward networks are commonly used for classification.

Learning Rules used:

- ***Momentum***

Momentum simply adds a fraction m of the previous weight update to the current one. The momentum parameter is used to prevent the system from converging to a local minimum or saddle point. A high momentum parameter can also help to increase the speed of convergence of the system. However, setting the momentum parameter too high can create a risk of overshooting the minimum, which can cause the system to become unstable. A momentum coefficient that is too low cannot reliably avoid local minima, and can also slow down the training of the system.

- Conjugate Gradient

CG is the most popular iterative method for solving large systems of linear equations. CG is effective for systems of the form A=xb-A (1) where x _is an unknown vector, b is a known vector, and A _is a known, square, symmetric, positive-definite (or positive-indefinite) matrix. (Don't worry if you've forgotten what "positive-definite" means; we shall review it.) These systems arise in many important settings, such as finite difference and finite element methods for solving partial differential equations, structural analysis, circuit analysis, and math homework.

Developed by Widrow and Hoff, the delta rule, also called the Least Mean Square (LMS) method, is one of the most commonly used learning rules. For a given input vector, the output vector is compared to the correct answer. If the difference is zero, no learning takes place; otherwise, the weights are adjusted to reduce this difference. The change in weight from ui to uj is given by: dwij = r* ai * ej, where r is the learning rate, ai represents the activation of ui and ej is the difference between the expected output and the actual output of uj. If the set of input patterns form a linearly independent set then arbitrary associations can be learned using the delta rule.

It has been shown that for networks with linear activation functions and with no hidden units (hidden units are found in networks with more than two layers), the error squared vs. the weight graph is a paraboloid in n-space. Since the proportionality constant is negative, the graph of such a function is concave upward and has a minimum value. The vertex of this paraboloid represents the point where the error is minimized. The weight vector corresponding to this point is then the ideal weight vector.

- Quick propagation

Quick propagation (Quickprop) [1] is one of the most effective and widely used adaptive learning rules. There is only one global parameter making a significant contribution to the result, the e-parameter. Quick-propagation uses a set of heuristics to optimise Back-propagation, the condition where e is used is when the sign for the current slope and previous slope for the weight is the same.

- Delta by Delta

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CONCLUSION

This paper demonstrated how artificial neural networks(ANN)could be used to build accurate age estimator. In order to train the neural network we extract shape features from real human face images that we captured at earlier time. We use Generalized Feed-Forward Network as classification. The result show that in training 45 year male is identify 88.88% or 25 year female is 80% and rest of 100% accuracy but in cross-validation result is not good.

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