Automatic Personality Analysis of an Individual using Modified Neural Network

Lini P Joy[1] Teena Susan Joseph[2] Hari S[3]
[1]M.Tech Student [2,3]Assistant Professor
[1,2,3]Department of Electronics & Communication Engineering
[1,2,3]Mount Zion College of Engineering, Kadammanitta, Pathanamthitta, Kerala, India

Abstract— An Automatic Personality Prediction System is very crucial in this modern era. Today, the world is in the brim of technological advancement. IoT events are progressing day by day. A Personality analysand is necessary in every field. Through this, not only emotions are recognized but also the hidden personality traits of an individual are predicted. Especially, this system is applicable in investigation process. Various experiments have been carried out in this area using several algorithms. Now also serious experiments are over-going for better results. A better futuristic approach is the integration of a powerful neural network into this system. A simple yet powerful neural network, that is, Convolutional Neural Network (CNN) is adapted for this personality prediction assignment. CNN is more advantageous compared to other neural networks.

Key words: Neural Network, Convolutional Neural Network (CNN)

I. INTRODUCTION

According to the current research in Machine learning, Facial Expression Recognition Systems gained so much momentum for more complex tasks. Always unconscious judgment of a person on others that he/she comes across in his/her day-to-day life is via the facial expressions. This is the first paper discussing about the application of Modified CNN in videos. Earlier work was concentrated in images. In this paper, the facial expressions are analyzed for diagnosing depression, predicting stress levels and predicting personality factors. It was also shown that there are links between common physical diseases such as heart attacks, diabetes, cancer, strokes, arthritis, hypertension etc. and Big Five personality traits. The proposed system provides 93.5% accuracy which is a great achievement comparing to the existing systems.

II. RELATED WORK

There are two major research areas, FER systems and personality trait prediction systems. In this paper, initial focus is on the FER systems and then latter on the personality trait prediction systems.

M. Pediaditis et al. concentrated in extracting facial features for detecting stress and anxiety. Stress and anxiety heavily affect the human well-being and health. Under chronic stress, the human body and mind suffers by constantly mobilizing all of its resources for defense. Going beyond the typical detection of 6 basic emotions, this study aims to elaborate a set of facial features for the detection of stress and/or anxiety. It employs multiple methods that target each facial region individually. The features are selected and the classification performance is measured based on a dataset consisting 23 subjects. The results showed that with feature sets of 9 and 10 features an overall accuracy of 73 percent is reached. This work presents the results of an initial study that aims to find an effective way for detecting early signs of stress and/or anxiety. A psychologically inspired deep convolutional neural network (PI-CNN) is proposed by J. Xhu et al., which facilitates both the facial beauty representation learning and predictor training. A new cascaded fine-tuning method is proposed to further improve the performance of PI-CNN facial beauty predictor with facial features of detail, lighting and color. Experiments indicate that the cascaded fine-tuned PICNN predictor obtains the highest correlation of 0:87 in the benchmark database, which is superior to the related hand-designed feature with shallow regressors and related deep learning methods. Setyadi et al. proposed the use of ANNs for predicting four temperaments.

III. CASCADED ARCHITECTURE

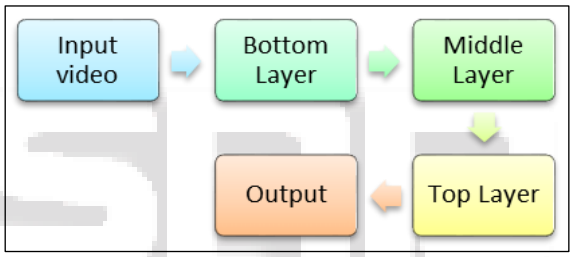

Fig. 1: Skeletal Architecture

The Architecture mainly comprises of three layers. They are the top layer, bottom layer and middle layer. The input video sample is given to the bottom layer. The bottom layer has mainly three functions:

- Face detection using Viola-Jones Algorithm
- Video Spoofing detection using LBP+SVM
- Gender Detection using Shape Feature Extraction

The output from the bottom layer is given to the middle layer, where the CNN performs all the personality trait detection. Then its output is passed on to the next layer, where the Big Five Factor prediction is carried out.

A. *The Bottom Layer*

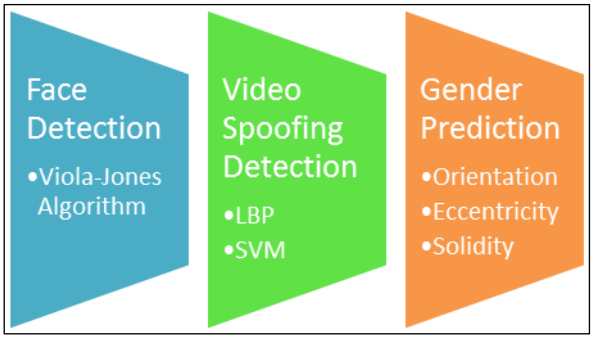

Fig. 2: Bottom Layer Structure

1) Viola-Jones Algorithm:

The cascade object detector uses the Viola-Jones algorithm to detect people's faces, noses, eyes, mouth, or upper body. Viola-Jones requires full view frontal upright faces. This algorithm has 4 stages:

1) Haar Feature selection
2) Creating an Integral Image
3) Adaboost Training
4) Cascading Classifiers

This algorithm is simple, robust and very efficient. Although its training is slow, it provides faster output.

2) LBP + SVM

Video Spoofing is more common in the current world. In order to detect video spoofing, the combination of LBP and SVM is used. Local Binary Pattern is a visual descriptor algorithm used for classification in computer vision. This is a special case of Texture Spectrum model. The concept of this algorithm is the comparison of a particular pixel with its neighboring 8 pixels. If the pixel value of the particular pixel is higher than the neighboring, then a binary value 0 is produced. Otherwise binary 1 is generated. This gives an 8-digit binary number. Compute a histogram using this value. Then normalize the histogram. Concatenate all the histograms obtained from every cell. This gives a feature vector for the entire window. This feature vector can now be processed using SVM (Support Vector Machine). SVM analyze the data used for classification and regression analysis and plot them as points in space. And these points are mapped to separate categories divided by a clear gap.

3) Shape Feature Extraction:

In order to detect gender, Shape features are extracted. Mainly 4 features are extracted for the prediction purpose over here. They are:

1) Orientation
2) Eccentricity
3) Solidity and
4) Perimeter

B. The Middle Layer

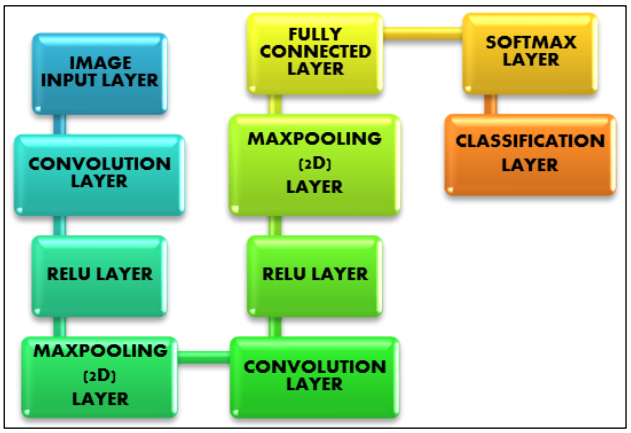

Fig. 3: Modified Convolutional Network Architecture

The Middle Layer consists of modified CNN. The modified CNN consists of many layers, namely, Input Image Layer, Convolution Layer, RELU Layer, Maxpooling Layer, Fully Connected Layer, Softmax Layer and Classification Layer.

C. The Top Layer

The Top layer predicts the Big Five factors that determine the personality of an Individual. The Big Five factors are the combination of four personality traits. The Big Five factors are:

- Introversion/Extraversion
- Low Anxiety/High Anxiety
- Receptivity/Tough-Mindedness
- Accommodation/Independence
- Lack of Restrain /Self-control

IV. RESULTS

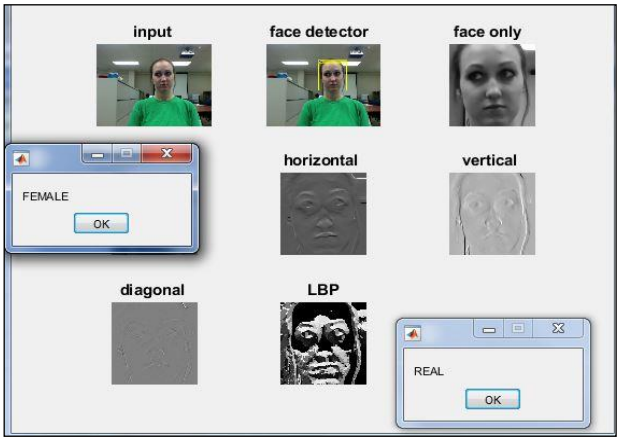

Fig. 4: Gender detection and Video Spoofing detection

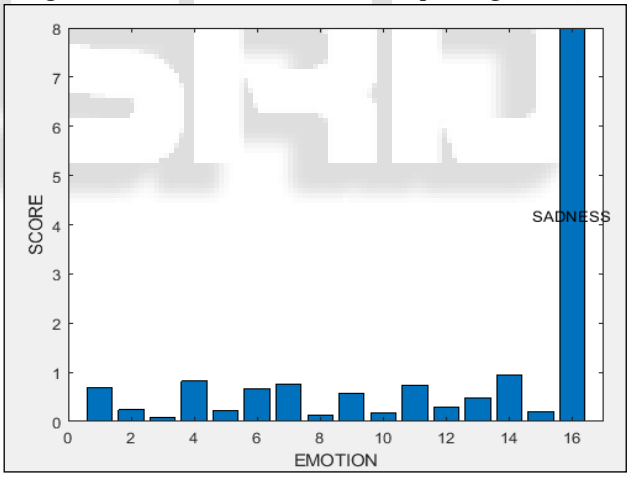

Fig. 5: Analysis Graph

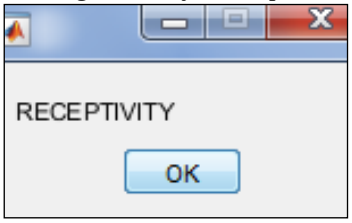

Fig. 6: Big Five Factor message box

V. CONCLUSION

This paper concerns with the human personality prediction and Big Five factor analysis. Modified CNN is the foundation of this particular system. CNN is a very simple yet highly depth informative neural network. It contains about ten layers. This whole system is maintained on three important

layers: The bottom Layer, the middle layer and the top layer. The Bottom Layer performs gender prediction and video spoofing detection. This system provides 93.5% accuracy. Through this, not only emotions are recognized but also the hidden personality traits of an individual are predicted. Especially, this system is applicable in investigation process. Various experiments have been carried out in this area using several algorithms. Now also serious experiments are over-going for better results.

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