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Automatic facial expression recognition based on spatial and temporal sequencing

Dr. P Meena Kumari 1 , Assoiate Professor, Department of CSE, **AVN Institute ofEngineering and Technology,**Hyderabad, Telangana, India.
Mr S Rameshbabu 2 ,Assistant Professor, Department of CSE, **AVN Institute of Engineering and Technology,**Hyderabad, Telangana, India.

ABSTRACT:

This project displays the application of feature extraction of facial expressions with combination of neural network for the recognition of different facial emotions (happy, sad, angry, fear, surprised, neutral etc..). Humans are capable of producing thousands of facial actions during communication that vary in complexity, intensity, and meaning. In this project by using an existing fer2013 data we have achieved 75 percent accurate results and it is easy and simplest way than Emotion recognition using brain activity system. Purposed system depends upon human face as we know face also reflects the human brain activities or emotions. In this project, Convolutional neural network has been used for better results, which is perfect when it comes to feature recognition from an image and we have Haar-Cascade to detect the region of image which contains the face so the model only has to work with the face region.

The advent of artificial intelligence technology has reduced the gap of human and machine. Artificial intelligence equips man to create more near perfect humanoids. Facial expression is an important tool to communicate one's emotions non verbally. This paper introduces an new methodology of deep neural networks for classifying facial expressions in a effective manner. Extensive attention facial expression recognition (FER) has received recently as facial expressions are considered as the fastest communication medium of any type of information. Facial expression recognition gives a better understanding towards a person's thoughts or views and analyzing them with the currently trending deep learning methods boosts the accuracy rate drastically compared to the traditional state-of-the-art systems. This project gives a brief about various application fields of FER and publicly available datasets used in FER and reviews the latest research in the field of FER using Random Forest Algorithm, Convolutional Neural Network (CNN) and deep learning. Lastly, it concludes the efficient method among them..

INTRODUCTION

FACIAL expression is one of the most powerful, natural and universal signals for human beings to convey their emotional states and intentions [1], [2]. Numerous studies have been conducted on automatic facial expression analysis because of its practical importance in sociable robotics, medical treatment, driver fatigue surveillance, and many other human-computer interaction systems. In the field of computer vision and machine learning, various facial expression recognition (FER) systems have been explored to encode expression information from facial representations. As early as the twentieth century, Ekman and Friesen [3] defined six basic emotions based on cross-culture study [4], which indicated that humans perceive certain basic emotions in the same way regardless of culture. These prototypical facial expressions are anger, disgust, fear, happiness, sadness, and surprise. Contempt was subsequently added as one of the basic emotions [5]. Recently, advanced research on neuroscience and psychology argued that the model of six basic emotions are culture-specific and not universal [6].

Although the affect model based on basic emotions is limited in the ability to represent the complexity and subtlety of our daily affective displays [7], [8], [9], and other emotion description models, such as the Facial Action Coding System (FACS) [10] and the continuous model using affect dimensions [11], are considered to represent a wider range of emotions, the categorical model that describes emotions in terms of discrete basic emotions is still the most popular perspective for FER, due to its pioneering investigations along with the direct and intuitive definition of facial expressions. And in this survey, we will limit our discussion on FER based on the categorical model.

FER systems can be divided into two main categories according to the feature representations: static image FER and dynamic sequence FER. In static-based methods [12], [13], [14], the feature representation is encoded with only spatial information from the current single image, whereas dynamic-based methods [15], [16], [17] consider the temporal relation among contiguous frames in the input facial expression sequence. Based on these two visionbased methods, other modalities, such as audio and physiological channels, have also been used in multimodal systems [18] to assist the recognition of expression.

The majority of the traditional methods have used handcrafted features or shallow learning (e.g., local binary patterns (LBP) [12], LBP on three orthogonal planes (LBP-TOP) [15], non-negative matrix factorization (NMF) [19] and sparse learning [20]) for FER. However, since 2013, emotion recognition competitions such as FER2013 [21] and Emotion Recognition in the Wild (EmotiW) [22], [23], [24] have collected relatively sufficient training data from challenging real-world scenarios, which implicitly promote the transition of FER from lab-controlled to in-the-wild settings. In the meanwhile, due to the dramatically increased chip processing abilities (e.g., GPU units) and well-designed network architecture, studies in various fields have begun to transfer to deep learning methods, which have achieved the state-of-the-art recognition accuracy and exceeded previous results by a large margin (e.g., [25], [26], [27], [28]). Likewise, given with more effective training data of facial expression, deep learning techniques have increasingly been implemented to handle the challenging factors for emotion recognition in the wild. Figure 1 illustrates this evolution on FER in the aspect of algorithms and datasets.

Exhaustive surveys on automatic expression analysis have been published in recent years [7], [8], [29], [30]. These surveys have established a set of standard algorithmic pipelines for FER. However, they focus on traditional methods, and deep learning has rarely been reviewed. Very recently, FER based on deep learning has been surveyed in [31], which is a brief review without introductions on FER datasets and technical details on deep FER. Therefore, in this paper, we make a systematic research on deep learning for FER tasks based on both static images and videos (image sequences). We aim to give a newcomer to this filed an overview of the systematic framework and prime skills for deep

Despite the powerful feature learning ability of deep learning, problems remain when applied to FER. First, deep neural networks require a large amount of training data to avoid overfitting. However, the existing facial expression databases are not sufficient to train the well-known neural network with deep architecture that achieved the most promising results in object recognition tasks. Additionally, high inter-subject variations exist due to different personal attributes, such as age, gender, ethnic backgrounds and level of expressiveness [32]. In addition to subject identity bias, variations in pose, illumination and occlusions are common in unconstrained facial expression scenarios. These factors are nonlinearly coupled with facial expressions and therefore strengthen the requirement of deep networks to address the large intra-class variability and to learn effective expression-specific representations.

LITERATURE SURVEY

As there is no staff available in unmanned restaurants, it is difficult for the restaurant management to estimate how the concept and the food is experienced by the customers. Existing rating systems, such as Google and Trip Advisor, only partially solve this problem, as they only cover a part of the customer's opinions. These rating systems are only used by a subset of the customers who rate the restaurant on independent rating platforms on their own initiative. This applies mainly to customers who experience their visit as very positive or negative.

[1] Different kinds of conservative advances contain carried out for Automatic FER systems. To generate a feature vector for training, association among facial apparatus is employed for geometric characteristics found lying on place and viewpoint of 52 degree of facial marker spots. Here primary viewpoint and Euclidean distance is calculated involving every duo of landmarks inside a framework and then distance along with angle values be deducted as of the matching space plus angle values of primary frame in record string. Two classifiers techniques are used here: multi class AdaBoost in the company of dynamic time warping and SVM on the boosted feature vectors.

[2] Diverse face expanses contain diverse styles of detail so look features are habitually mined on or after universal face area. Happy et al. used an approach of Local Binary Pattern (LBP) histogram with dissimilar chunk ranges as of a universal facade region as a characteristic vector plus after that categorized diverse facial expression via Principal Component Analysis (PCA). Though this technique is applied in instantaneous environment, its precision is corrupted as of not able to mirror local differences of facial sections to characteristic vector.

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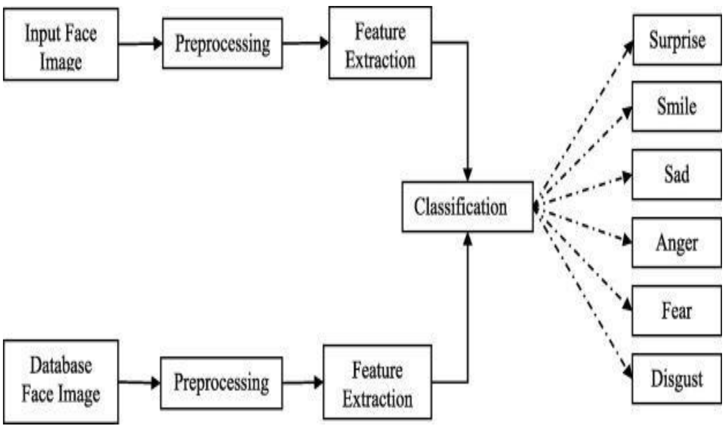
[3]Diverse face regions contain poles apart intensities of significance. For instance, compare to forehead plus cheek, eyes in addition to mouth contains additional information. Ghimire et al. divided whole face region hooked on domain precise local expanses to extract appearance features and using an incremental search method, important local regions were identified which provides improvement in recognition accuracy and reduction in feature dimensions. Many researchers have identified different feature extraction methods and classifiers for conventional approaches. For facial expression recognition well known methods for characteristic mining like Histogram of Oriented Gradients (HOG), Local Binary Pattern (LBP), distance along with angle relation flanked by facial landmarks plus classifiers for instance Support Vector Machine (SVM), AdaBoost, Random Forest are employed founded on mined characteristics. Benefits of conservative approaches are that they oblige inferior computing control with remembrance compared to Deep learning based procedures. Thus these procedures are tranquil mortal employed in real time organizations since of their lower computational difficulty along with higher accuracy

[4].In existing algorithm we are use in Haar-adaBoost classification algorithm, in this classification accuracy is less.

Existing System:

As there is no staff available in unmanned restaurants, it is difficult for the restaurant management to estimate how the concept and the food is experienced by the customers. Existing rating systems, such as Google and TripAdvisor, only partially solve this problem, as they only cover a part of the customer's opinions. These rating systems are only used by a subset of the customers who rate the restaurant on independent rating platforms on their own initiative. This applies mainly to customers who experience their visit as very positive or negative.

Architecture



Proposed System:

In order to solve the above problem, all customers must be motivated to give a rating. This paper introduces an approach for a restaurant rating system that asks every customer for a rating after their visit to increase the number of ratings as much as possible. This system can be used unmanned restaurants; the scoring system is based on facial expression detection using pretrained convolutional neural network (CNN) models. It allows the customer to rate the food by taking or capturing a picture of his face that reflects the corresponding feelings. Compared to text-based rating system, there is much less information and no individual experience reports collected. However, this simple fast and playful rating system should give a wider range of opinions about the experiences of the customers with the restaurant concept.

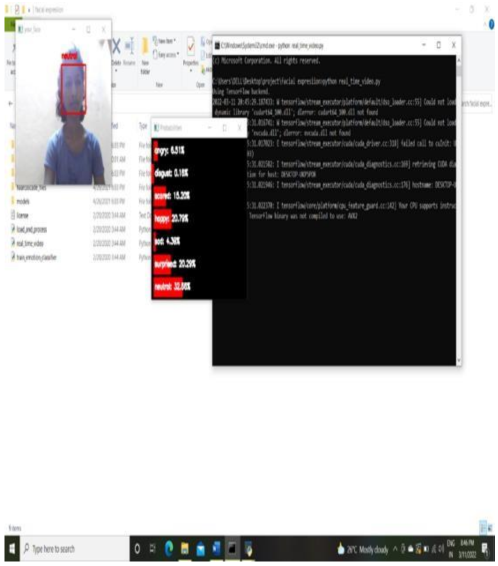
Advantages :-

Security

Improving memory utilization through parallelization

RESULT

The present project is aimed at classification of phishing websites based on the features. For that we have taken the phishing dataset which collected from uci machine learning repository and we built our model with three different classifiers like SVC, Naïve Bayes, ELM and we got good accuracy scores. There is a scope to enhance it further. if we can have more data our project will be much more effective and we can get very good results. For this we need API integrations go get the data of different websites.



CONCLUSION

Data bias and inconsistent annotations are very common among different facial expression datasets due to different collecting conditions and the subjectiveness of annotating. Researchers commonly evaluate their algorithms within a specific dataset and can achieve satisfactory performance. However, early cross- database experiments have indicated that discrepancies between databases exist due to the different collection environments and construction indicators [12]; hence, algorithms evaluated via intra-database protocols lack generalizability on unseen test data, and the performance in cross-dataset settings is greatly deteriorated. Deep domain adaption and knowledge distillation are alternatives to address this bias [226], [251]. Furthermore, because of the inconsistent expression annotations, FER performance cannot keep improving when enlarging the training data by directly merging multiple datasets [167]. Another common problem in facial expression is class imbalance, which is a result of the practicalities of data acquisition: eliciting and annotating a smile is easy.

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