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AGE INVARIANT FACE RECOGNITION USING CONVOLUTIONAL NEURAL NETWORK FOR FACE IDENTIFICATION

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Abstract: One of the most popular technologies in the world of image processing nowadays is face recognition across age groups. has become a very prevalent and challenging task in the realm of face recognition. Notwithstanding the numerous contributions made in this sector by professionals and researchers, there is still a substantial gap that has to be filled... Using the appropriate feature extraction and classification techniques is essential in this sector.

A Convolutional neural networks combine feature extraction and classification in a single structure for deep learning. Using CNN architecture to recognise facial pictures as a person matures has overcome the issue of ageing. The Extensive experimentation has been used to evaluate the effectiveness of the suggested system.

Keywords: Feature Extraction, CNN, Face Recognition, Deep Learning.

I. INTRODUCTION

Computer vision is the study of how computers could learn a great deal from digital images or movies (CV). Its tasks include approaches for digital picture capture, processing, analysis, and comprehension as well as the extraction of high-dimensional data from the real world to produce numerical or symbolic information.Deep learning developments and improved hardware performance have accelerated the development of computer vision and related fields. Work in the military, healthcare, autonomous systems, and automated inspection are among the applications for computer vision. Face recognition technology can identify and confirm a person from an image or a video frame.

One use of computer vision is face recognition, which compares the generated facial profile to other recognised faces to identify the person. Face recognition makes use of unique facial traits, such as skin texture or thermal profile. By replicating how the human brain works, a series of algorithms known as Artificial Neural Networks (ANN) seek to find hidden connections in a piece of data. It functions by changing "weights" as training progresses and anticipating the output using these changed weights. A Convolution Neural Networks (CNN), a subclass of Deep Neural Networks (DNN), are most typically used to study visual perception. They are employed in time series analyses of financial data, recommender systems, picture classification, medical image analysis, and image and video recognition.According to the "A-pie" rule, the main problems with face recognition are ageing, pose, illumination, and expression.The precision of stance, illumination, and emotion fluctuations has improved due to technological and algorithmic developments. In terms of ageing, there is still opportunity for improvement.

II. LITERATURE SURVEY

Literature survey 1:

Ageing face recognition was addressed using a method that offered a hierarchical model built on two levels of learning and a brand-new feature descriptor called Local Pattern Selection (LPS). The method focused on the role of facial asymmetry in identifying age-separated face photos and was based on matching-score space (MSS). Using a small set of geometric features, authors were able to recognise faces regardless of age. Based on a set of selected feature points and the FGNET dataset, its performance was evaluated. Parked et al. proposed a broad method that makes use of a 3- D ageing model to improve the face recognition performance on age invariant. They employed various modelling techniques and position correction for shape and texture.

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Literature survey 2:

Gong et al. introduced the maximum entropy feature descriptor (MEFD), a brand-new feature descriptor, to recognise age-invariant facial images. It describes a distinguishing quality. In order to improve recognition accuracy, a new feature-matching method called Identity Factor Analysis is presented (IFA). Ali et al. focused on a set of form and texture traits for age-invariant face identification. They made use of the texture feature of LBP variance and the form attribute of phase congruency. Bouchaffra created a special framework for age-invariant face recognition that lowers the dimensionality and extracts topological traits like form. This method combines the "Kernelized Radial basis function" (KRBF) for dimensionality reduction, the construction of a shape for feature extraction, and the mixing of multinomial distributions for object classification.

Real-Time Facial Emotion Recognition System With Improved Preprocessing and Feature Extraction:

This paper aims to build an enhanced system that can analyse the exact facial expression of a user at that particular time and generate the corresponding emotion. Datasets like JAFFE and FER2013 were used for performance analysis.

Inclusion of preprocessing methods like cropping and intensity normalisation and feature extraction methods like HoG and facial landmarks improved the accuracy.

Facial Emotion Recognition Using Deep Convolutional Neural Network:

The main focus of this work is to create a Deep Convolutional Neural Network (DCNN) model that classifies 5 different human facial emotions. The model is trained, tested and validated using the manually collected image dataset.

The model has comparable training accuracy and validation accuracy which convey that the model is having a best fit and is generalized to the data.

III. EXISITING SYSTEM

- As accordingly to the previously invention mouse motion through eye blink was possible but the circumstances that occurred were the small blink or shorts blink were neglected.
- Even hardware was used for detecting eye blinks but it used to cause a eye damage.

IV. PROPOSED SYSTEM

The project is planned in an ensemble approach, by selecting some already established models, and some models of our own, and predicting on all of these models at the same time. All the models make use of different approaches to extract different features, which are mostly age invariant, and perform predictions in their own unique way, thus overcoming almost all loopholes which might be encountered while predicting using one single approach. Along with the pre-existing approaches, a different approach is being applied, where only the age invariant features are being extracted from the image before any predictions are made.

Face detection is the major use of Haar cascade. The methodneeds a large number of training datasets, where positive datasets are photos with faces and negative datasets are images without faces. Extraction of features from these photos is the next step. Haar characteristics are utilised for this. Each rectangle represents the image's bright and dark areas. These rectangles show a single value that was created by combining bright and dark patches.

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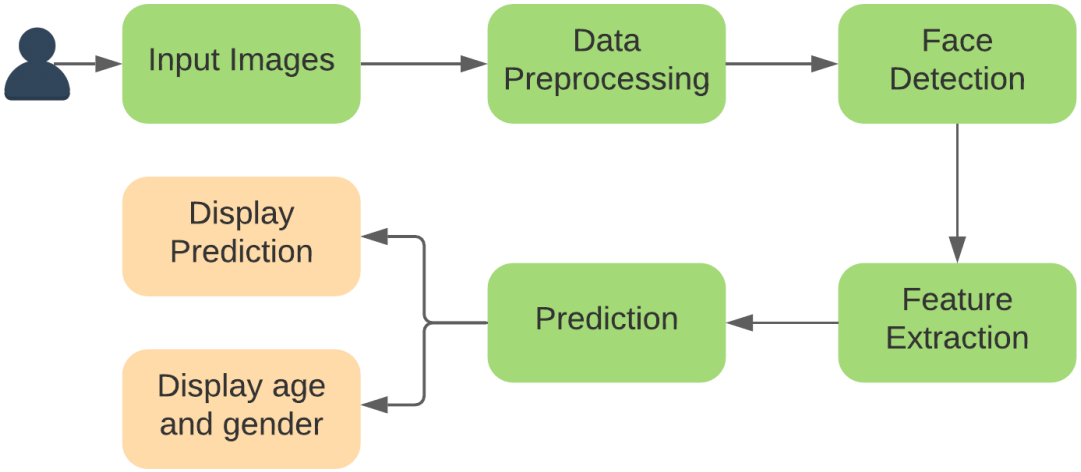

A. Feature Extraction

In order to improve human interpretations, feature extraction is a method that is used in both pattern recognition and image processing. It begins with measureddatasets and builds matching values that are meant to be useful and facilitate learning. Reducing the number of assets needed to represent enormous amounts of data is thegoal of feature extraction. Large numbers of variables are likely to result in errors while doing sophisticatedcalculations. From this point forward, we compute the issue using a general way of combining variables.

Images processing is one of the key areas of this application,where the algorithm locates and separates forms and points that contain features of an image or video in grey scale. It is essential for determining visual objects. Following a phase ofdetermining a pixel's code value in an image's metrics, features are extracted. Based on it, the output is displayed after the characteristics are specifically retrieved from those Grayscale images. Predefined interfaces in software packagesoffer feature extraction and dimension reduction. The algorithms are openly accessible.

B. Classification of Extracted image

Valance points will be placed all over the face, and these points are used to calculate emotions and expressions. The separation and angle between these spots determine the type of emotion and the percentage (which runs from 0 to 100) of the user's facial expression. For instance, if the input is joy, the weighted sum of each individual emotion divided by the sum of all expressions yields the overall percentage. If the sum is more than the cut-off point, the corresponding emotions are shown. The points also compute degree ofconfidence, which determines the likelihood that population parameters are correct, in addition to valence metrics. The accuracy of emotion detection will increase with confidence level

a. Back Propagation Neural Network (BPNN)

Because of its simplicity and efficiency in utilising a large training data set, the multilayer back propagation neural network was used as one of the classifiers in the current work.

b. Support Vector Machine (SVM)

The multi-class Support vector machine is a potentially linearclassifier that is based on the concept of decision planes, which define decision boundaries(SVM). An illustration thatdistinguishes between a group of items with different class memberships is called a decision plane. A hyperplane that separates pixels into various classes is made using the training data.

c. k-Nearest Neighbor (k-NN)

To categorise test results using a distance metric, an ad hoc classifier known as the k-nearest neighbour (k-NN) algorithm is used. In the current work, the neighbourhood parameter "k"is used to identify images with a desired value range (k = 1, 2, 3). The selection of the "k" value, which is essential to theclassifier's performance, is influenced by both the dataset and the intended application.

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V. CONCLUSION

In this project, we proposed a novel methodology for age invariant face recognition using Convolutional Neural Network named. Experimentation has been performed image datasets. In this approach, our goal is to provide a simple network by using less number of layers, small image size(32x32) for processing. This system preserved simplicity as no separate algorithm is required for feature extraction. The results have demonstrated that it is better than current state of-the-arts in Rank-1 recognition on both the datasets. Moreover, no complicated preprocessing steps are used for head pose correction. Resized images of size 32x32 pixels show better results as compared to images of size 64x64 pixels on both datasets. CNN as a final classification stage, shows significant improvement in the performance.

ACKNOWLEDGEMENT

We compare several image types in this study, and the results' degree of accuracy is really appealing. It works well with both photos and videos. 90% of the outcomes are reliable. This is quicker to implement and consumes less memory as compared to competing methods. With this, it is simple to find criminals and track down missing people, and it is dynamically updated. The analysis process makes use of real criminal images that were discovered online and yields useful conclusions. We believe that this application will reduce crime in our neighbourhood.

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