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GENDER RECOGNITION USING FACIAL IMAGES

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Abstract - *The real-time gender classification based on facial images is proposed by an approach using a convolutional neural network (CNN). In contrast with the other CNN solutions that were implied over the pattern recognitions the CNN architecture which has been put forward displays a much reduction in design complications. The count of processing layers in the CNN is decreased by only four due to which it leads to meld the convolutional and sub sampling layers. However in conventional CNNs, we replace the convolution operation with cross-correlation, so it reduces the computational load. The perspective used for either evaluating or distinguishing these characteristics from the images of the facial features have been relied on variation from the element of facial measurements or "modified" face descriptors. The results are corresponding to a classification which is better at its performance and also while verifying that the proposed CNN is an effective real-time solution for gender recognition. The system not only recognizes the gender but also according to the gender it will show the advertisements which are suitable for the different age group of people. Both the genders have different advertisements for the different age group and also if they want to purchase the product they could do so by clicking on the image.*

Key Words: recognition, convolution networks, gender, design, facial expressions.

1.INTRODUCTION

Gender and age recognition from face images is one of the fundamental research areas in computer vision. Automated gender and age recognition is important in many application areas such as human computer interaction, biometric, surveillance, demographic statistics etc. Human face contains important visual information regarding gender perception. It is difficult for a machine to recognize the visual information which separate male faces from female faces. There are various researches being conducted so that a machine is able to achieve human level accuracy. Various methods have been proposed for classifying gender and age from several controlled and uncontrolled dataset. It is more challenging in uncontrolled situations. [1] The humans are also not able to recognize neither gender nor age because of few images which are so confusing. There are plenty of opportunities available to improvise the performances of gender recognition and its different approaches. [2]

Gender play fundamental role in social interactions. The languages play a vital role by reserving different salutations and grammar rules for both the genders and very often different vocabularies are used when addressing elders than compared to young people. Apart from the basic roles these attributes play in our everyday lives, the ability to estimate them automatically as well as accurately and also reliability from face images is still far away from meeting the commercial applications needs and its uses. It is particularly perplexing while considering recent claims to super-human capabilities in the related task of face recognition. The approaches which were used on past for estimating or classifying the attributes from face images have being dependent on differences in facial feature dimensions and the face descriptors.[3] There are many people who have employed themselves for classification schemes designed particularly for age or gender estimation tasks. Few of these past methods were designed to handle many challenges of unconstrained imaging conditions. However, the machine learning methods employed by the systems did not fully exploit the massive numbers of image examples and data available through the Internet in order to improve classification capabilities.

Gender and age classification was initially perceived as an issue in psychophysical studies; it focuses on the efforts of understanding human visual processing and identifying key features used to categorize or segregate male and female individuals. There are various researches been implemented which describes the dissimilarities between facial attributes and femininity that can be utilized to improve the performance of face recognition applications in biometrics, human-computer interactions, surveillance as well as computer vision, The challenge in a real-world environment is how to deal with the facial image being affected by the variance in factors which could be described as illumination, pose facial expression, occlusion, background information, and noise. [4] The main difficulty over here is to upgrade in vigorous classification system which would definitely be done through the face based predictions due to which it will impact over the precision as well as the actual time when the event would be occurred.

The conventional perspective which has indeed applied for the recognition of the facial features includes the recognition which is done by the face-based and it also typically involves the different phases of image acquisition, processing, dimensionality reduction, feature extraction, and also classification, in that order.

The most important aspect of the application domain is used to determine the best feature extractor to design. The performance of the system which is recognized is totally dependent on the category of classifier chosen, which is in either way depending on the method applied of the feature extraction. It becomes very complicated to search for a classifier that combines with the selected feature extractor such that optimal classification performance is achieved. It requires changes to the problem domain and to complete redesign of it. [2] The convolutional neural network (CNN) is a neural network variant that comprises many convolutional layers that are changing with subsampling layers and end with one or more fully connected layers that are in the standard multilayer perceptron (MLP). A very important advantage of CNN compared with the conventional approaches in pattern recognition is its ability to simultaneously take the features as well as reduce data dimensionality and also classify in one network structure.

2. LITERARURE SURVEY

There is an outstanding role which is being played by the Gender Classification in different aspects of the computer related innovative applications which has indeed not studied yet while comparing it with the most famous difficulties of recognition and identification. The lion share's of the previous solutions for pattern recognition difficulties rely trainable or else no trainable classifiers which are then preceded by heuristic-based feature extractors. This section brief discusses previous works from the perspective of the classification methods applied. [5] The machine which is popularly recommended for the algorithm is support vector machine (SVM) and it is highly used for the classification purposes. The local binary pattern as well as the SVM which is used in gender classification system with polynomial kernel and it was brought forward which resulted in the classification rate of 94.08% over the CAS-PEAL face database and it was immediately reported. The approximation time needed to processs the time is rounded by 0.12s and it was brought forward by MATLAB 6.1 implementation on a 3.0 GHz CPU. A major disadvantage of the method includes high classification performance can only be achieved if the block size for the LBP operator is correctly selected, which is a rather difficult task to be performed. The task which has been reported has on the top categorization perfection of 99.30% on the SUMS face database.

The task which was done on Viola and Jones face detection, 2D-DCT feature extraction and it also included the classifier which was the K-means nearest neighbour (KNN). The algorithm named 2D-DCT is a compute-intensive algorithm so due to which this method is not suitable for real-time applications. While comparing with the other first attempts to apply neural networks in gender classification, there was one which was reported in with a fully connected MLP used in conjunction with a large number of image processing modules, the average error rate was 8.1%, which is rather large compared to state-of-the-art results. [9] The hybrid approach proposed in processed the face image with principal component analysis (PCA) for dimensionality reduction. There was a genetic algorithm (GA) which was then used to select a good subset of Eigen features. An average error rate of 11.30% was reported. Furthermore, to the poor error rate occurred the main disadvantage of this method is an effective global random search method, the GA exhibits high computational problem. The execution which was upper-level mastered due to a shunting of inhibitory neuron that had two activation functions and a division to perform. The CNN which has being put forward comprises six different layers, with the end stage being a single neuron to represent the output class. [7] The categorization rate of 94.7% for FERET database was accomplished on unmixed datasets. Briefly, the above CNN-based solutions signify the potential of reaching higher-level presentation in recognition difficulties as well as gender classification to be particular.

3. PROPOSED SYSTEM

The photo is first taken from the webcam stream live by the cv2 module. At present we have a technique that can instantiate a model with five different stages which are namely; width, height, depth, classes, and final activation. The measurement of the input image which is in pixels will be taken in the form of width and height. The shallowness which definably represents the number of channels, which will be 3 to handle our different image. [7] Classes will be the number of categories we have in our dataset. In this scenario there will be 8 different situations for our types of vehicles and colour likelihood combined. In spite of the fact that the end activation would be by default set to "softmax" if there is any modification then the value to "sigmoid" will immediately enable Keras to perform multi-label classification for our result. The prototype itself contains of many different stages which will be followed by alike pattern. The convolution layers which are in 2D tend to be activated and it double the filter size on every moment to allow for more and more abstraction. Dropout is used to randomly disconnect nodes leading to the next layer that will work to prevent over-fitting our model. [8]

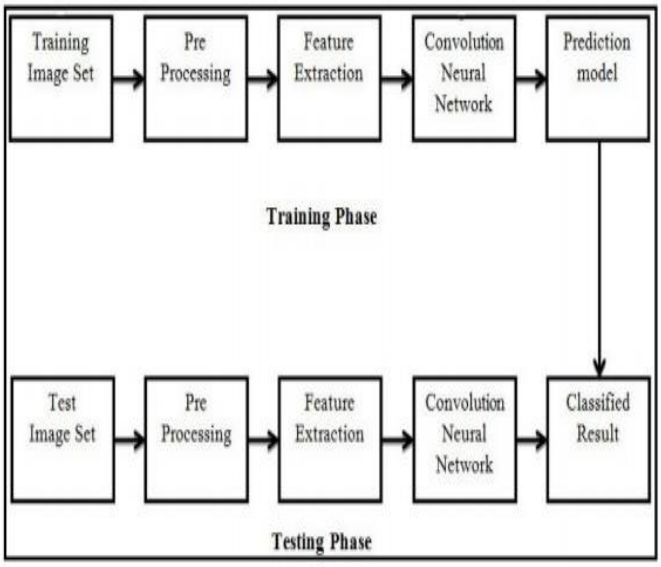

Fig.1. Block Diagram

The above mentioned Figure 1 illustrates the block diagram of our system. There are different stages like pre-processing, feature extraction, training image set, prediction model and the classified result. The initial stage starts with the training of the image which trains the image properly. [10] After the image is been trained, it now comes under the preprocessing stage. [11] There are variations in preprocessing which are not accurate enough. The accuracy can be improved by the proper alignments of the facial portion. Dropout is used to randomly disconnect nodes leading to the next layer that will work to prevent over-fitting our model. Then in feature extraction all the facial features are being extracted. [12] Then in prediction model the gender is predicted which finally leads us to the result of it.

To carry on with we'll move forward by pre-processing image data and figuring out our classifications. We start by importing the necessary packages. To preserve the images in the background, there will be a need to set back-end as matplotlib. The Convolutional neural network (CNN) is stated as one of the main categories to do images recognition as well as images classifications. [8]The object detections, face recognition are some of the areas where CNNs are widely used. The CNN image classifications take an input image, process it and classify it under certain categories. The computer which sees an input image as array of pixels it depends on the image resolution.[6] It will appear as H x W x D (h = Height, w = Width, d = Dimension) which is based on the image resolution.[8]

4. IMPLEMENTATION DETAILS

We have also implemented with the help of our system in which after detecting the gender it will recommend some advertisements. The advertisements have been categorized according to the gender as well as different age groups. The user can also purchase the product by clicking on the picture which will be redirected to the official page of it. The bar chart has also being implemented in the system which illustrates the count of the people according to the age group and by gender. We have categorized our system into different aspects such as Face Detecting page, Advertisement Page and also the Bar chart which together depicts the system.

We have further divided into two parts which the user can access it according to its requirements. The first option we have given is of Image. So over here the user can select the picture from the computer according to its location. Then the second option is of turning the web cam on and detecting the image live.

The below mentioned Figure 2 illustrates that the gender has been recognized and also the age has been recognized. In the Figure it is clearly seen that gender of the person has also been recognized has male and his age has also been shown.

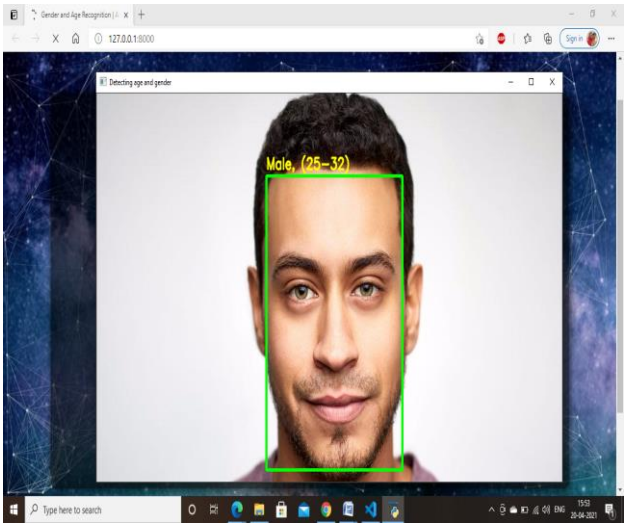

Fig.2. Face Detection

The below mentioned Figure 3 illustrates that according to the gender detected, it shows the different types of advertisements which the user can puchase it by just clicking on the picture. The small card is also displayed which shows the gender as well as age of the person.

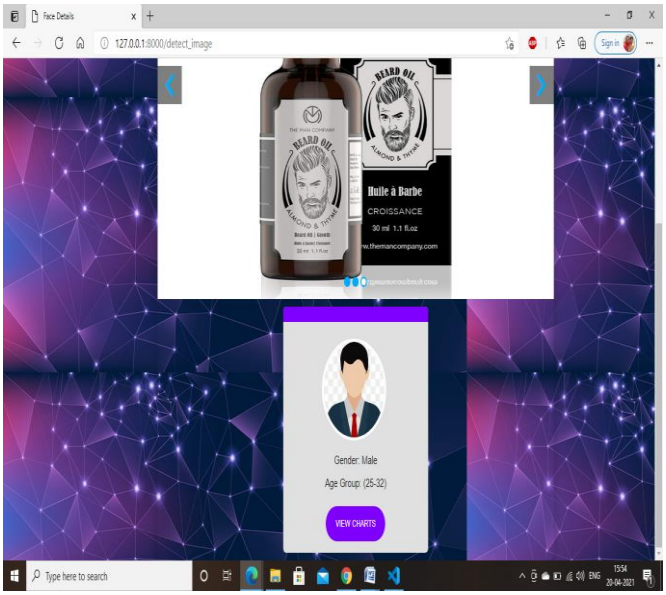

Fig.3. Advertisement Page

5. ANALYSIS

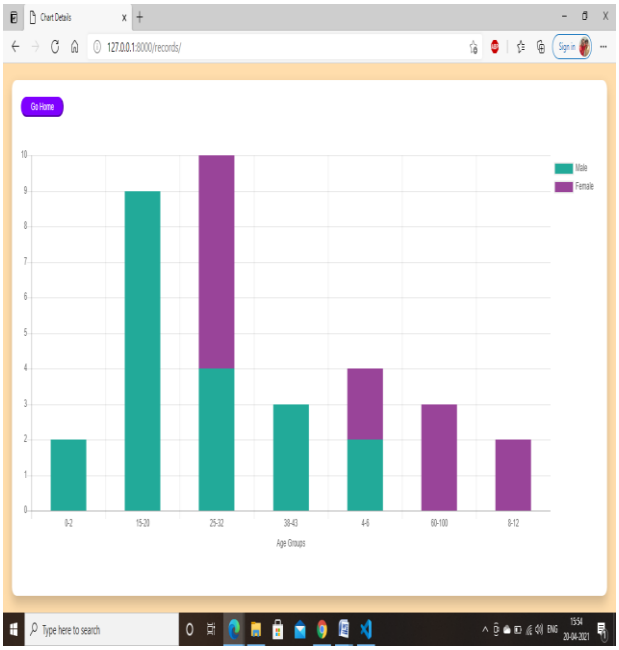

Fig.4. Bar Chart

The above diagram illustrates the basic analysis of our system. It depicts which age group people have visited the most and due to which it becomes easy for us to recommend the advertisements to that age group. Along with it we can add age prediction

There are two different colors given in the bar chart to recognize the difference between male and female. The male over here could be recognized by green color whereas females could be recognized by purple color due to which it becomes easy to recognize which gender group as well as which age group the people have visited the most. Along with it we can add age prediction

Then while comparing with male, the females have visited the most in the age group from 25-32. The males have visited the least in this age group. Along with it we can add age prediction But in contrast to it, in the age group from 15-20 it's only visited by males none of the females have visited that age group which makes it clear we need to put more recommendations of advertisements in that age group.

Moreover if we go further then we'll see that in the age group above 60, only females have visited, there were no males seen in this particular age group. We came to know from this that in 60 and above age group we need more advertisements recommendations for female so that ratio increases. The advertisements applied for male in that age group was not used as we expected.

Likewise if we come backwards in the age group from 4-6 we'll see that the both male and female have visited equally. There's hardly any difference in that age group. The advertisements which were recommended were used properly and both the gender people have used it successfully. Along with it we can add age prediction

Thus, from this analysis we came to know that which age group people visits the most and which age group people visits the least over here. This helps us to recommend more advertisements to the age group visited the most as well as to the gender group visits. This analysis also helps us to keep a track record of the people which shows the count of the people visited in that particular age group.

6. CONCLUSION AND FUTURE SCOPE

There are many previous methods that have addressed the problems of age and gender classification but recently much of this work has focused on constrained images taken in lab settings. These settings do not adequately reflect appearance variations which common to the real-world images in social websites and online repositories. Internet images are not simple but more challenging and also they are abundant. The image collections which are easily available they provide modern machine learning based systems with effectively endless training data, However this data is not always suitably labeled for supervised learning. While considering the example from the related problem of face recognition we explore how well deep CNN perform on these tasks using data.

In future we can add mailing system where it will mail an alert message to concerned facility. We can add recognition by speech where along with face images it will also predict the gender using speech. By using speech, we can even add decibel limit where if the sound crosses a certain limit it will alert the faculty. Along with it we can add age prediction for recording the crowd in that area and after analysis displaying advertisements accordingly.

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