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FACE IMAGE CLASSIFICATION USING CNN

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ABSTRACT:

With the rise of social media and other platforms, age and gender prediction is important in today's life. In this paper, facial attributes such as age and gender are estimated from facial images taken under severalconditions. These facial attributes, such as age and gender, can not only predict age and gender, but also improve facial recognition performance. In this paper, we proposed a method for predicting age and gender from facial images using a convolutional neural network. The convolutional neural networks are not only inexpensive but also provide good results.

I. INTRODUCTION

Two of the most important face mask attributes, age and gender, play an important role in social communication.The applications of this age and gender detection are marketing information, criminal identification visual observation, etc. Age recognition plays a major role in Police investigation and Intelligence department as it is helpful in finding the actual suspect on the basis of his age. They could get a filtered out result of that person who has performed criminal act or any other activity. If a person gives a biased opinion about his age after getting result from a age recognition software then the actual age and predicted age would be approximately same which tells its reliability and this reliability make a trust factor for many other useful operations in daily life. Prediction of Age and Gender still lacks its accuracy. The relevant applications of age and gender predictions systems are growing rapidly in recent days due its important modules and beneficial uses for computer vision application. There are some use cases that demonstrate the problem and we are going to address these problems. Moreover the best use of age and gender recognition is in social media, marketing and advertisements. Social media platforms can predict your age and genders and shows such contents which is of interest level of people of that age limit. It also helps growing e-commerce business and internet marketing business as it would help them advertise products according to interest level of that age group which in turn gives benefit to users too. So, our main objective is to train a model which can predict age and gender in most efficient way. It is also aimed to use in age specific content access limitation by which system can detect age and gender and allows/deny user to access that content.

Detecting age and gender from an image is a challenging problem than many other tasks in the field of computer vision. For predicting anything we need to train our model with sample data. The difficulty lies in the nature of the sample data that is needed to train these types of systems. In this era of internet for general object classification tasks we often have access to millions of images. But the data needed for supervised learning should be labelled data. That means the images should be labelled with age and gender. Finding this type of data is challenging since they are very small in number when compared to labelled data. For labelling data, the real problem is that we don't have access to some personal information of the people like their date of birth and, they may not be accurate. So, for our work in detecting age and gender, we are using the kaggle dataset.This Kaggle dataset contains several facial images of the persons across the world.

II. EXISTING WORK

Over the past several years, the studies are undergoing on the areas of facial feature extraction and predicting age and gender based on that. To address this concern scientists had come up with various approaches, and each of these approaches solved some critical problems that were raised in this field. For predicting age and gender accurately, even some of the minor differences in the images should be extracted carefully. Extracting facial features to that extent is challenging and only a few approaches focused on solving this problem. Those minor differences include size of the eyes, ears, mouth and the distances between them. most of early methods have focused on images which were maintained in lab conditions (like maintaining ideal lighting, angle of the image, etc.). very few methods have addressed the difficulties that arise when applying these methods to real world images.

III. PROPOSED WORK

In this proposed system, we will develop a deep learning model using Convolutional neural networks. The model receives the image and passes it through different layers by reducing the size in each layer. We then train our model using the kaggle dataset which contains over several images of human beings which include different ethnicity, color, and many more factors. The dataset also provides a label for each image. Once the model is trained, we can use the model for testing. We first detect the presence of a human in each image. Then, we process the image using the Open

CV framework to obtain all the human faces present in the image. Each face is then processed by a developed deep learning model to get the output label which essentially gives us the age and gender of each person in the image.

IV. SYSTEM FLOW

There are 2 steps in building this model. They are:

1. **Model design:** The actual deep learning model is designed using convolutional neural networks.
2. **Training the model**: The model is trained using a large set of images taken from the dataset.

V. SYSTEM IMPLEMENTATION

In this implementation first, we need to extract the face from an image provided in the dataset. That is done by using Python's OpenCV module. Face Detection using Haarfeaturebased cascade classifiers which is a machine learning-based approach is an effective object detection method. There will be a lot of positive and negative images and the classifier is trained based on it. It is then used to detect the face in other images. For age and gender prediction we have used our proposed CNN architecture through outour experiments. The schematic diagram for our CNN model is shown in Figure 1.

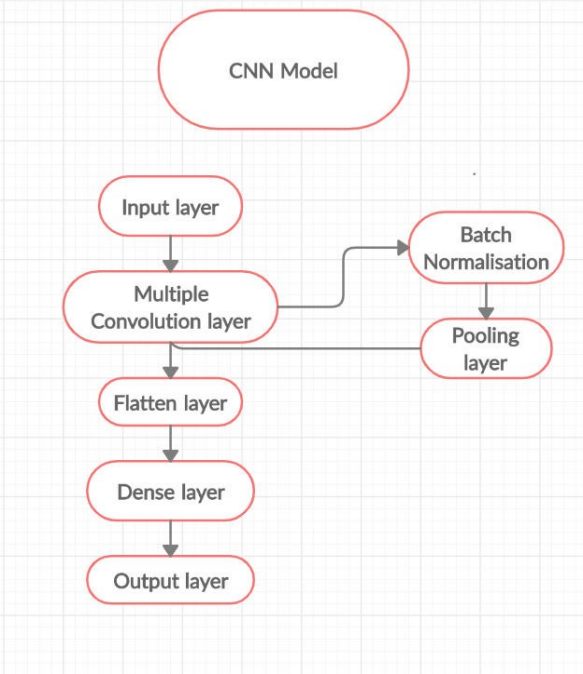

Figure 1: CNN Model

After finishing the model design, we will now move into training our model. For training our model, first step is Forward Propagation. The process of transforming an input tensor to an output tensor is called Forward Propagation. For predicting the results from our network, we have used our forward method. The network will return a prediction tensor and that tensor contains a prediction value for our input. The tensor's shape will be 1 x 10. This means that the length of the first axis is one while the length of the second axis is ten. This means that, in our batch there will be one image and that image will have ten prediction classes. For most of the classes probabilities were near to 10%, and this is true since we get 10 prediction classes for an image and network is guessing based on those ten classes.

So Basically, in our work, we have performed these 4 steps

- Prepare the data
- Build the model
- Train the model
- Analyze the model's results

To extract features from the face and to test the results we pass our images to a pre-trained network. We use two sets of images. One is for training and another one is for testing purposes. When we consider one dataset which consists of several subsets and each of those subsets describes a class. Next, we have resized our images to make it suitable for furthers operations that are carried out in the network. All the features have been

obtained after running the pre-trained deep-learning neural network. We have obtained an average accuracy of 86% for age classification. The graph between accuracy and epoch is shown in the figure 2.

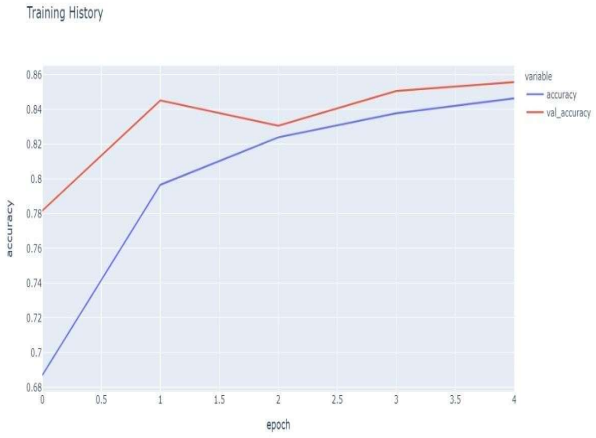

Figure 2: Graph between accuracy and epoch

The confusion matrix is used to tabulate the classifications per class. The confusion matrix for age and gender classification is shown in the figure 3.

Figure 3: Confusion Matrix

The age and gender of the images in the dataset is Predicted and it is shown in figure 2.

Figure 4: Age and Gender of images in dataset

VI. CONCLUSION

The computerized facial recognition industry has made many useful advances over the last decade, but the need for more accurate systems remains. This project offers higher accuracy and less time than other traditional facial recognition methods. Convolutional neural networks improve the accuracy of theage and gender detection. Thus, by using convolutional neural network the accuracy is increased to 86%.

VII. REFERENCES

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