

A Survey on different techniques used for age and gender classification

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Abstract - Age and gender, the two main facial features, play a very important role in social interaction, making the measurement of age and gender from a single face image an important function in intelligent systems, such as access control, computer interaction, law, marketing intelligence, and visual monitoring, etc. In this survey paper, we looked at a few papers and concluded that the convolutional neural network is the most appropriate application for age and gender segregation.

Keywords: Age, Gender, Personal Computer Interaction, Access Control, Convolutional Neural Network, visual monitoring.

1. INTRODUCTION

Age and gender data are important for a variety of real-world applications, including social comprehension, biometrics, identity verification, video surveillance, personal computer interaction, electronic customers, crowd behavior analysis, online advertising, object recommendations, and much more. Without being overused, measuring age and gender from facial images is a difficult problem to solve. The many sources of intra-class variation in human facial expressions limit the effectiveness of these models in real-world systems. In this project, the application is designed to determine the age and gender of the person in the photo. The app is built using android and the internal part of the android app that finds age and gender is built using in-depth learning. The UTF K Face data database containing approximately 20000 images is used to train an in-depth learning model. UTF K Face data set is not a data set previously processed. Therefore, we will need to process the database and apply it to a deeper learning model. The mobile net model is used as an in-depth learning model due to its lightweight characters, which helps to build applications of smaller sizes. Mobile net is an in-depth learning model provided for tensor flow. Our paper is organized into four sections. Category I contains an introduction to age and gender classification. Phase II covers the literature review of the various age and gender adoption papers. Section III contains a discussion and analysis of the various papers and data sets. Section IV contains the conclusion of the survey paper.

2. LITERATURE SURVEY

A survey of age and gender segregation strategies was developed and described below and concluded by comparing

different strategies that can be used to differentiate age and gender.

1] Malik, Rati, et al. (IRJET, 2020) has proposed a comprehensive learning solution for measuring age and gender recognition. Using in-depth reading concepts, you can easily distinguish age and gender more accurately, even if the numbers are slightly accurate. We use the Kaggle database, which is the largest human face database available for training. Contains all meta information. Age and gender segregation uses the advanced Karas TensorFlow API. Karas are used to build and train models. If you have a small amount of data, you can easily interpret gender and age using TensorFlow, a key open-source library that helps you improve models. They used the VGG face model to measure age using the VGG16 architecture that works with cropped facial images.

2] Trivedi, Pisa (International Journal of Computer Applications, 2020) has suggested that a person's face provides more information about age, gender, attitude, etc. Influenced by a number of changing factors that change over time, such as aging, hair loss, facial features, and more. Automation has covered a wide range of virtual reality applications. Similarly, age and gender factors can also be adjusted automatically. Methods of differentiating age by gender can improve the understanding and power of computer interactions. CNN is an efficient in-depth learning platform that captures multimedia data such as images, videos, or various 2D / 3D data. Obviously, determining gender and age by facial features interacts with photo and video data.

3] Saxena, Singh, et al. (IEEE, 2021) has proposed a paper that systematically describes the whole process, the various methods and algorithms that can be used, the most accurate method, and how all of this is integrated. We will also highlight its importance and how it can be useful in our daily lives. The main goal of this article is to create a gender and age identifier that can predict the gender and age of a person's face in an image using in-depth reading of the targeted database. In addition, get the most effective predictions and results by overcoming the problem of accuracy and timing.

4] Agrawal, and Dixit (Springer, 2020) A proposed study that states that from a human point of view, it is possible to measure a person's age by age on the basis of imagination

but that from a mechanical point of view they cannot. Adjusting the age and gender of a facial image is a challenging task in the machine due to the variety, brightness, and other facial features. This paper raised age estimates and predicted human sexuality from facial imagery using a convolutional neural network. In the proposed pre-training and testing process, re-use the PCA to reduce the size of the extracted components. This is done on the IMDBWIKI public data set and our data set using the MATLAB platform for use.

5] Chao Yin et.al (IEEE, 2019) suggested in their paper that the Conditional Probability Neural Network (CPNN) is a distributed learning algorithm used to measure age using facial expressions. It follows a three-layer neural network system with targets and a vector of conditional features as included. This can help you to learn your exact age. The training method of this program uses the relationship between the image of the face and the distribution of its label via the neural network. The method previously used assumed that measurements should be used according to the high entropy model. CPNN has shown the best results of all previously created methods. In this way, the results obtained are very simple, require minimal calculation, and the results are very effective. With all these qualities, he was loved more than anyone else.

6] Liu, Li et. Removes sex with the age group of a camera image taken. Train GoogleNet using the Adience data set. Multi-GPU-based asynchronous stochastic gradient descent is used to improve the learning process. We aim to use a trained network to build a separation system in the real world to demonstrate the possibility. For example, it can apply to targeted deliveries at bus stops or supermarkets. The results show that the accuracy of the separation network can be improved by training in advance. In addition, a multi-GPU training platform can improve training speed during recognition.

3. DISCUSSION AND ANALYSIS

A comparative analysis is made of the different techniques used for Age and Gender Classification which is discussed below in Table 1. In addition to this, a study of different datasets such as Kaggle, Adience dataset and IMDB-WIKI have also been carried out. The description of each of the datasets is explained in Table 2.

SI No	Author, Publication, and Data set	Technique used	Results
1	Malik, Rathi et al. (IRJET, 2020) Data set: Kaggle	CNN	Accuracy 96%
2	Trivedi, Pise (International Journal of Computer Applications, 2020) Data set: IMDB-WIKI Image Net	CNN	Accuracy 66%

3	Saxena, Singh et al. (IEEE, 2021) Data set: Adience	Lightweight multi-task CNN	Age accuracy-44% Gender accuracy-85%
4	Agrawal, Dixit (Springer, 2020) Data set: IMDB-WIKI	Deep CNN	Age accuracy-61% Gender accuracy-88%
5	Chao Yin et.al (IEEE, 2019) Data set: Adience	CPNN	Age accuracy-72% Gender Accuracy-94%
6	Liu, Li et al. (IEEE, 2019) Data set: Adience	Google Net	Age accuracy-50% Gender accuracy-85%

Table -1: Comparison of different techniques

SI. No	Data Set	Description
1	Kaggle	Size: 20000. Format: png
2	IMDB WIKI	Size: 523051 photos. Format: jpg.
3	Adience	Size: 26580 photos. Format: jpeg

Table -2: Dataset description

In conclusion from the analysis and the survey, it is found that using a Convolutional Neural Network, a deep learning technique has achieved 96% accuracy for age and gender classification. Similarly, some authors have also used Convolutional Probability Neural Network, and thereby accuracy achieved is 72% in terms of Age classification and 94% in terms of Gender Classification.

4. CONCLUSION

In conclusion, standard gender classification studies and age ratings can be used to solve real-time application problems. In this paper, much of the research work is done on the Convolutional Neural Network (CNN), which automatically identifies key features without human control. That is why CNN is an ideal solution for image processing problems with 96% accuracy.

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