**UNIVERSITY OF CALICUT**

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**DEPARTMENT OF COMPUTER SCIENCE MSc. COMPUTER SCIENCE**

**SYNOPSIS**

**Topic: *Age and Gender Detection***

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**ABSTRACT**

Age and gender, two facial attributes play a major role in the society. An automatic age and gender recognition have a vast number of real-world applications includes a customer service, the priority voting system, medical diagnosis, the human computer interaction. Deep learning techniques are commonly used in most researches and achieved to improve the performance too. Implementing different deep learning models and evaluating the improvement in accuracy leads to further researches. So, in this deep learning project. we will be creating real-time gender and age detection using Deep Learning, and also in this, we will be using pre-trained models that classify the gender and age of the person. So the model will predict the gender as ‘Male’ and ‘Female’, and the predicted age will be in one of the following ranges- (0-2),(4-6), (8-12),(15-20),(25-32),(38-43),(48-53),(60-100). The main purpose of paper is, to conduct a detailed examination of age and gender recognition through various datasets and deep learning models. In this paper, explain the progress made by, highlighting the contributions addressed, the models and dataset used and evaluating the suggested approach with the results obtained.

**INTRODUCTION**

Due to the rise of social platforms and social media nowadays, there is also an increase in the number of applications that want automatic age and gender classification. As we know, age and Gender are two key facial attributes that play a very important role in social interactions. Human face contains characteristics that determine identity, age, gender, emotions, ethnicity. Therefore, the process of age and gender assessment is an important step for many applications.

In this paper an attempt has been made to perform gender classification of human facial image based on the extracted feature from the input image set. In most of the past researches, individually designed features with the models. Machine learning models are popularly used. Machine learning is the study of computer algorithms that can be improved automatically through the use of experience and data. These machine learning models i.e., individually designed features behave deficient on some datasets, and it fails to produce expected results. In some datasets it produces better results too. Due to inadequacy on some dataset, researches to make progress into convolutional neural network based deep learning models. In deep learning train model with large amounts of data and complex algorithms, and automatically extract features from facial images. Some neural network based deep learning models are VGG16, VGG19, Xecption, ResNet50V2, ResNet101V2,InceptionV3,Inception,ResNetV2,MobileNet,MobileNetV2,DenseNet121,DenseNet169,DenseNet201,NASNetMobile,EfficientNetB0,EfficientNetB1,EfficientNetB2,EfficientNetB3,EfficientNetB

Deep learning simply a subset of machine learning. While comparing with simple machine learning concepts deep learning works like to imitate how humans think and learn. Deep learning makes the processes easier and faster. Facial age and gender recognition is one of the greatest applications of deep learning. CNN (Convolutional neural network) simply has one or more convolutional layers and has some specific functions too. It some great functions that it automatically detects important features, pre-processing is less dependent, need of human effort is less without any lose on quality, and it also reduces the number of parameters.

**MODULE DESCRIPTION**

**1.Load Dataset**

UTK Dataset comprises age, gender, images, and pixels in .csv format. Age and gender detection according to the images have been researched for long time. Different methodologies have been assumed control over the years to handle this issue. Presently we start with the assignment of recognizing age and gender utilizing the Python programming language.

Keras is the interface for the TensorFlow library. Use Keras on the off chance that you need a profound learning library that allows simple and quick prototyping (through ease of use, seclusion, and extensibility). Support both convolutional networks and repetitive organizations, just as blends of the two. Run flawlessly on CPU and GPU.

**2.Train and Test the model**

Training & Testing. In order to save training time each set was separately forward passed via each model to get corresponding 9 Numpy ndarrays as extracted input feature vectors and saved. Since the faces were already aligned and cropped no further preprocessing was carried out and input dimensions are kept same as original RGB photos i.e., 200 x 200 x 3. For gender classification, the loss is binary cross-entropy function. Class weights were also taken into account while training to make up for slight class imbalance as there are roughly 48% female and 52% male in the both the training and validation set. For age estimation, being a regression task, the loss function was mean squared error. The optimizer used in both cases is the AMSGrad variant of Adam [15] with an initial learning rate of 0.001 which is halved in the ending phase of training 8 for better convergence. The choice of optimizer was based on the experiments carried out while training our custom CNN architecture and theory

**3 Evaluation**

The performance of the age estimation algorithms is evaluated based on the closeness of the predicted value to the actual value. The metrics widely used for the age estimation as a regression task is the mean absolute error or MAE which captures the average magnitude of error in a set of predictions. MAE calculates the absolute error between actual age and predicted age as defined by the equation (1). 𝑀𝐴𝐸 = 1 𝑛∑ |𝑦𝑗 − 𝑦̂𝑗 | 𝑛 𝑗=1 (1) Where n is the number of testing samples, 𝑦𝑗 denotes the ground truth age and 𝑦̂𝑗 is the predicted age of the j-th sample. For classification tasks (age and gender), the evaluation metric used was accuracy which denotes the fraction of correctly classified samples over the total number of samples.

**4 Experimentation and Results**

In this section we summarize the results obtained via the extensive experiments performed in the study and compare different methods from work of other researchers.

**SOFTWARE AND HARDWARE SPECIFICATION**

**HARDWARE SPECIFICATION**

System: Intel Processor: Core i7

Ram Capacity: 8GB Hard Disk Drive: 1TB

Keyboard: Standard

Mouse: Standard

**SOFTWARE SPECIFICATION**

Platform: Windows OS

Front End: Tkinter

Back End: python Language

Browser: Google Chrome, Mozilla Firefox, Internet Explorer