

Age Gender Detection

Business Problem:

In current times we have many difficulties in facial detection and its analysis. With age gender detection we are trying to find numeric age of live video capturing of face detected and its gender. Goal of this project is to extract facial feature after training with dataset. Face detection to be implemented to execute algorithm on detected face.

Data availability:

- Dataset used for training neural network is UTKFace. There are around 27.3k images which can be used for training and validation.
- There are two gender values in data: Male and Female.
- Age is also extracted for training and validation.

Below is the data distribution of gender between male and female:



Figure 1. Age Distribution of Male and Female

Below is age distribution for the dataset:

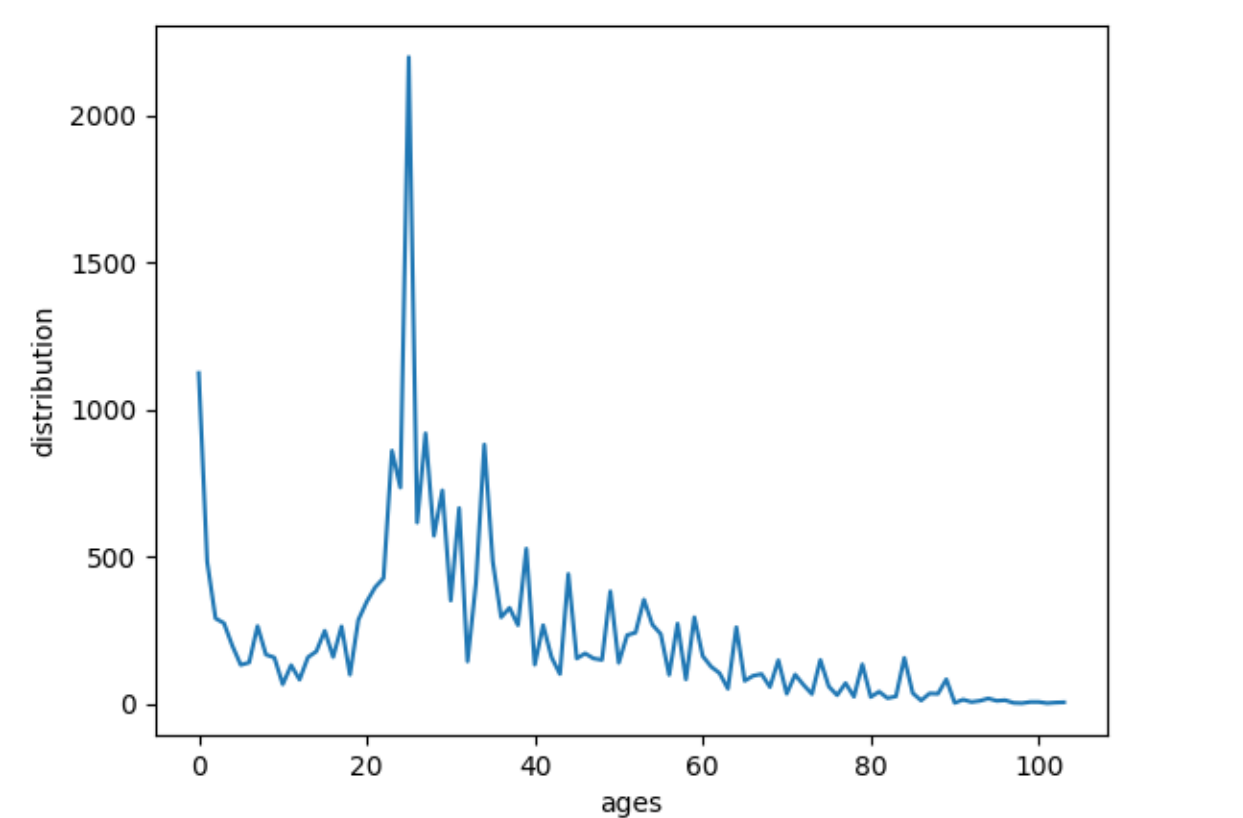


Figure 2. Age distribution of Data

We have divided training and validation in 75:25 ratio.

Neural Network:

Below is the architecture of neural network used.

Layer (type)	Output Shape	Param #	Connected to
input_1 (InputLayer)	[(None, 48, 48, 3)]	0	[]
conv2d (Conv2D)	(None, 48, 48, 32)	896	['input_1 [0] [0]']
Dropout (Dropout)	(None, 48, 48, 32)	0	['conv2d [0] [0]']

Activation (Activation)	(None, 48, 48, 32)	0	['dropout [0] [0]']
max_pooling2d (MaxPooling2D)	(None, 24, 24, 32)	0	['activation [0] [0]']
conv2d_1 (Conv2D)	(None, 24, 24, 64)	18496	['max_pooling2d [0] [0]']
dropout_1 (Dropout)	(None, 24, 24, 64)	0	['conv2d_1 [0] [0]']
activation_1 (Activation)	(None, 24, 24, 64)	0	['dropout_1 [0] [0]']
max_pooling2d_1 (MaxPooling2D)	(None, 12, 12, 64)	0	['activation_1 [0] [0]']
conv2d_2 (Conv2D)	(None, 12, 12, 128)	73856	['max_pooling2d_1 [0] [0]']
dropout_2 (Dropout)	(None, 12, 12, 128)	0	['conv2d_2 [0] [0]']
activation_2 (Activation)	(None, 12, 12, 128)	0	['dropout_2 [0] [0]']
max_pooling2d_2 (MaxPooling2D)	(None, 6, 6, 128)	0	['activation_2 [0] [0]']
conv2d_3 (Conv2D)	(None, 6, 6, 256)	295168	['max_pooling2d_2 [0] [0]']
dropout_3 (Dropout)	(None, 6, 6, 256)	0	['conv2d_3 [0] [0]']
activation_3 (Activation)	(None, 6, 6, 256)	0	['dropout_3 [0] [0]']
max_pooling2d_3 (MaxPooling2D)	(None, 3, 3, 256)	0	['activation_3 [0] [0]']
Flatten (Flatten)	(None, 2304)	0	['max_pooling2d_3 [0] [0]']
Dense (Dense)	(None, 64)	147520	['flatten [0] [0]']
dense_1 (Dense)	(None, 64)	147520	['flatten [0] [0]']
dropout_4 (Dropout)	(None, 64)	0	['dense [0] [0]']
dropout_5 (Dropout)	(None, 64)	0	['dense_1 [0] [0]']
sex_out (Dense)	(None, 1)	65	['dropout_4 [0] [0]']
age_out (Dense)	(None, 1)	65	['dropout_5 [0] [0]']

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Total params: 683,586

Trainable params: 683,586

Non-trainable params: 0

Model Evaluation:

Below is comparison between predicted and actual age:

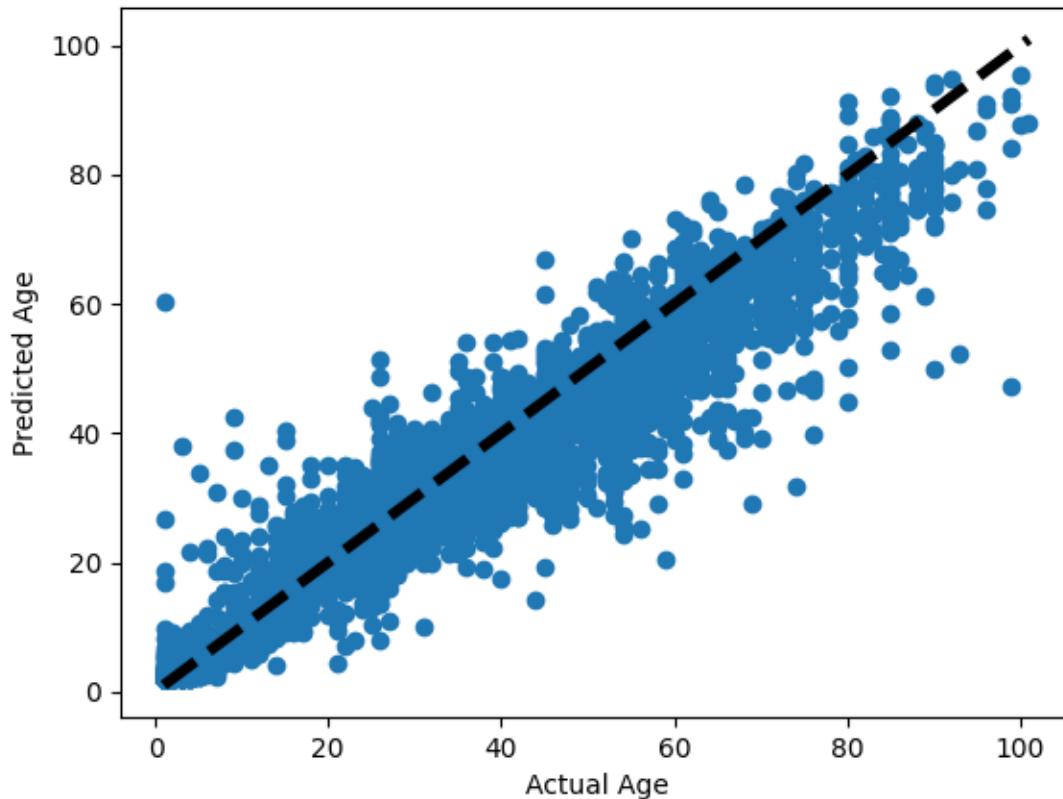


Figure 3. Actual vs Predicted Age

	precision	recall	F1 Score	Support
0	0.90	0.90	0.90	3108
1	0.89	0.89	0.89	2819
Accuracy			0.89	5927
macro avg	0.89	0.89	0.89	5927
weighted avg	0.89	0.89	0.89	5927

Files:

The system has three files. 'age_and_gender_prediction.py' creates the HDF5 file in which it saves the model which will be used for prediction. 'age_gender_model.py' imports and load that model which is used for prediction of age and gender. In same file code is written to create center box around the streaming images which are converted to RGB. 'model_eval.py' does the partial evaluation of model saved.

Software Used:

1. PyCharm 2021.2
2. Libraries: Tensorflow, Numpy, SKLearn, tensorflow.keras, OpenCV2, MTCNN, matplotlib.pyplot and seaborn, MTCNN.

Conclusion:

The model generated can be used for predicting age and gender of live capture video using webcam. Using this model we can predict the age and gender of a person.

Appendix:

1. Dataset: <https://www.kaggle.com/datasets/jangedoo/utkface-new>
2. Reference: <https://techvidvan.com/tutorials/gender-age-detection-ml-keras-opencv-cnn/>

Future Work:

I want to add one more prediction for emotion of user in same system which will display facial emotion expression.