

Answers	Coding Efficiency	Viva	Timely Completion	Total	Dated Sign of Subject Teacher
5	5	5	5	20	

Start Date :

Date of Completion:.....

Deep Learning Mini Project -2

Title - Implement Gender and Age Detection: predict if a person is a male or female and also their age

Project title: "Gender and Age Detection on UTKFace dataset"

Objective: To build a deep neural network model that can recognize Gender and Age Detection on UTKFace dataset

Theory -

Collect and prepare the dataset: In this case, we can use the "UTKFace" dataset which contains images of faces with their corresponding gender and age labels. We need to preprocess the data, like resizing the images to a uniform size, shuffling the dataset, and limit the age to a certain value (like 100 years).

Split the dataset: Split the dataset into training, validation, and testing sets. The usual split ratio is 80%, 10%, and 10%, respectively.

Define data generators: Define data generators for training, validation, and testing sets using the "ImageDataGenerator" class in Keras. This class provides data augmentation techniques that can improve the model's performance, such as rotation, zoom, and horizontal flip.

Define the neural network model: Define a convolutional neural network (CNN) model that takes the face images as input and outputs two values - the probability of being male and the predicted age. The model can have multiple convolutional and pooling layers followed by some dense layers.

Compile the model: Compile the model with appropriate loss and metrics for each output (gender and age). In this case, we can use binary cross-entropy loss for gender and mean squared error (MSE) for age.

Train the model: Train the model using the fit method of the model object. We need to pass the data generators for the training and validation sets, as well as the number of epochs and batch size.

Evaluate the model: Evaluate the model's performance on the testing set using the evaluate method of the model object. This will give us the accuracy and mean absolute error (MAE) of the model.

Predict the gender and age of a sample image: Load a sample image and preprocess it. We can use the "cv2" library to read the image, resize it to the same size as the training images, and normalize it. Then, we can use the "predict" method of the model object to get the predicted gender and age.

Source Code-

```
import tensorflow as tf

from tensorflow.keras.models import Sequential

from tensorflow.keras.layers import Dense, Flatten, Conv2D, MaxPooling2D, Dropout

from tensorflow.keras.preprocessing.image import ImageDataGenerator

import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

import cv2

# Define constants

img_height = 128

img_width = 128

batch_size = 32

epochs = 10

# Load the "UTKFace" dataset

df = pd.read_csv('UTKFace.csv')
```

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```
df['age'] = df['age'].apply(lambda x: min(x, 100)) # limit age to 100

df = df.sample(frac=1).reset_index(drop=True) # shuffle the dataset

df['image_path'] = 'UTKFace/' + df['image_path']

df_train = df[:int(len(df)*0.8)] # 80% for training

df_val = df[int(len(df)*0.8):int(len(df)*0.9)] # 10% for validation

df_test = df[int(len(df)*0.9):] # 10% for testing

# Define data generators for training, validation, and testing sets

train_datagen = ImageDataGenerator(rescale=1./255)

val_datagen = ImageDataGenerator(rescale=1./255)

test_datagen = ImageDataGenerator(rescale=1./255)

train_generator = train_datagen.flow_from_dataframe(

    dataframe=df_train,

    x_col='image_path',

    y_col=['male', 'age'],

    target_size=(img_height, img_width),

    batch_size=batch_size,

    class_mode='raw')

val_generator = val_datagen.flow_from_dataframe(

    dataframe=df_val,

    x_col='image_path',

    y_col=['male', 'age'],

    target_size=(img_height, img_width),

    batch_size=batch_size,

    class_mode='raw')

test_generator = test_datagen.flow_from_dataframe(

    dataframe=df_test,
```

```
x_col='image_path',
y_col=['male', 'age'],
target_size=(img_height, img_width),
batch_size=batch_size,
class_mode='raw')

# Define the neural network model

model = Sequential([
    Conv2D(32, (3,3), activation='relu', input_shape=(img_height, img_width, 3)),
    MaxPooling2D((2,2)),
    Conv2D(64, (3,3), activation='relu'),
    MaxPooling2D((2,2)),
    Conv2D(128, (3,3), activation='relu'),
    MaxPooling2D((2,2)),
    Conv2D(128, (3,3), activation='relu'),
    MaxPooling2D((2,2)),
    Flatten(),
    Dropout(0.5),
    Dense(512, activation='relu'),
    Dense(2)
])

# Compile the model

model.compile(optimizer='adam',
              loss={'dense_1': 'binary_crossentropy', 'dense_2': 'mse'},
              metrics={'dense_1': 'accuracy', 'dense_2': 'mae'})

# Train the model

history = model.fit(train_generator,
```

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```
epochs=epochs,  
validation_data=val_generator)  
  
# Evaluate the model on the test set  
  
loss, accuracy, mae = model.evaluate(test_generator)  
  
print("Test accuracy:", accuracy)  
  
print("Test MAE:", mae)  
  
# Predict the gender and age of a sample image  
  
img = cv2.imread('sample_image.jpg')  
  
img
```

Conclusion- In this way Gender Age Detection Implemented.

Assignment Question

1. What do you mean Mean Squared Error (MSE)?
2. What do you mean by Mean Absolute error (MAE)?
3. What are data generators?