A

MINI PROJECT REPORT ON

"Human Face Recognition."

SUBMITTED TO THE SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
FOR
Laboratory Practice V: Deep Learning

BACHELOR OF ENGINEERING (COMPUTER ENGINEERING)

SUBMITTED BY

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Contents

PROBLEM DEFINITION:
To implement a Human Face Recognition system.

OBJECTIVE:
The objective of human face recognition is to develop technology and systems that can accurately identify and authenticate individuals based on their facial features. The primary goals of face recognition are:

1. Identification
2. Verification/Authentication
3. Non-intrusiveness
4. Automation
5. Security and Safety
6. Personalization

HARDWARE AND SOFTWARE REQUIREMENTS:
Hardware Requirements: Ubuntu/Windows OS, 512 MB HDD, 4 GB RAM
Software Requirements: Python 3, Spyder

INTRODUCTION:

Face recognition is the task of identifying an already detected object as a known or unknown face. Often the problem of face recognition is confused with the problem of face detection. Face Recognition on the other hand is to decide if the "face" is someone known, or unknown, using for this purpose a database of faces in order to validate this input face.

THEORY CONCEPTS:

Convolutional Neural Networks (CNNs):

Convolutional Neural Networks (CNNs) are commonly used for image classification tasks, and they are designed to automatically learn and extract features from input images. Let's consider an example of using a CNN to classify images of handwritten digits. In a typical CNN architecture for image classification, there are several layers, including convolutional layers, pooling layers, and fully connected layers. Here's a diagram of a simple CNN architecture for the digit classification task: The input to the network is an image of size 28x28 pixels, and the output is a probability distribution over the 10 possible digits (0 to 9). The convolutional layers in the CNN apply filters to the input image, looking for specific patterns and features. Each filter produces a feature map that highlights areas of the image that match the filter. The filters are learned during training, so the network can automatically learn which features are most relevant for the classification task. The pooling layers in the CNN downsample the feature maps, reducing the spatial dimensions of the data. This helps to reduce the number of parameters in the network, while also making the features more robust to small variations in the input image. The fully connected layers in the CNN take the flattened output from the last pooling layer and perform a classification task by outputting a probability distribution over the 10 possible digits. During training, the network learns the optimal values of the filters and parameters by minimizing a loss function. This is typically done using stochastic gradient descent or a similar optimization algorithm. Once trained, the network can be

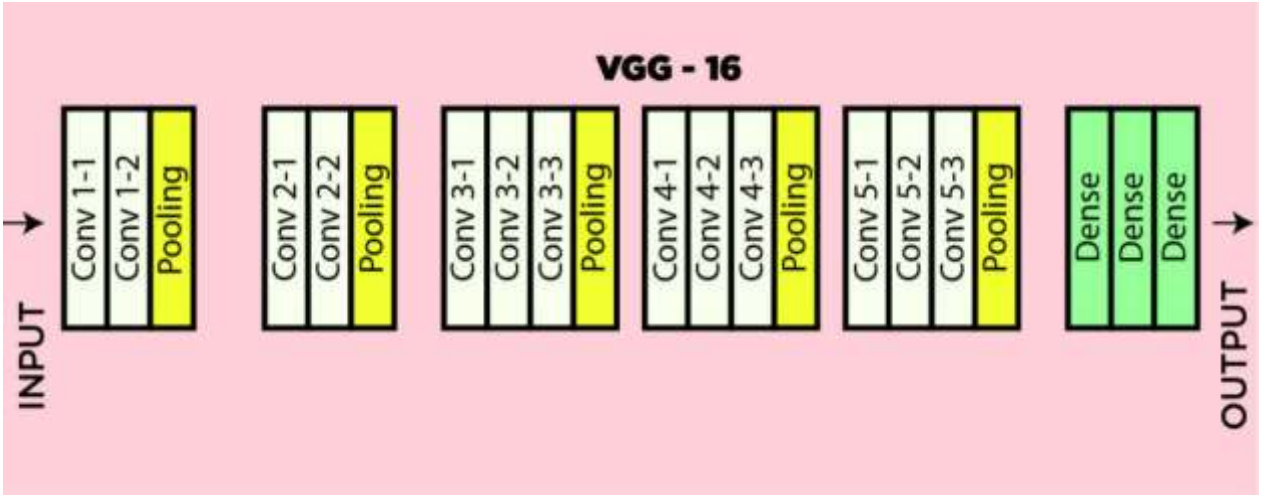
used to classify new images by passing them through the network and computing the output probability distribution. Overall, CNNs are powerful tools for image recognition tasks and have been used successfully in many applications, including object detection, face recognition, and medical image analysis.

VGG16:

A convolutional neural network is also known as a ConvNet, which is a kind of artificial neural network. A convolutional neural network has an input layer, an output layer, and various hidden layers. VGG16 is a type of CNN (Convolutional Neural Network) that is considered to be one of the best computer vision models to date. The creators of this model evaluated the networks and increased the depth using an architecture with very small (3 × 3) convolution filters, which showed a significant improvement on the prior-art configurations. They pushed the depth to 16–19 weight layers making it approx — 138 trainable parameters.

VGG16 used for:

VGG16 is an object detection and classification algorithm which is able to classify 1000 images of 1000 different categories with 92.7% accuracy. It is one of the popular algorithms for image classification and is easy to use with transfer learning.



FUTURE SCOPE:

The future scope of human face recognition holds significant potential for advancements and applications in various fields. Here are some areas where face recognition is expected to make further progress:

1. Enhanced Security and Surveillance: Face recognition systems will continue to play a crucial role in security and surveillance applications. Advanced algorithms and hardware will enable more

accurate and reliable identification of individuals, aiding law enforcement agencies, airports, and public spaces in preventing crime and enhancing public safety.

2. Biometric Authentication: Face recognition is poised to become a primary biometric authentication method. As technology improves, it will be increasingly used for secure access control to devices, applications, and sensitive information. This includes unlocking smartphones, accessing bank accounts, and securing online transactions.

3. Human-Computer Interaction: Face recognition can revolutionize human-computer interaction. With improved technology, devices will be able to recognize and understand facial expressions, gestures, and emotions. This can lead to more natural and intuitive interactions with computers, virtual assistants, and augmented or virtual reality systems.

4. Personalized User Experiences: Face recognition can facilitate personalized user experiences in various domains. From retail to entertainment, systems can recognize individuals and provide tailored recommendations, targeted advertisements, and customized services based on their preferences and demographic information.

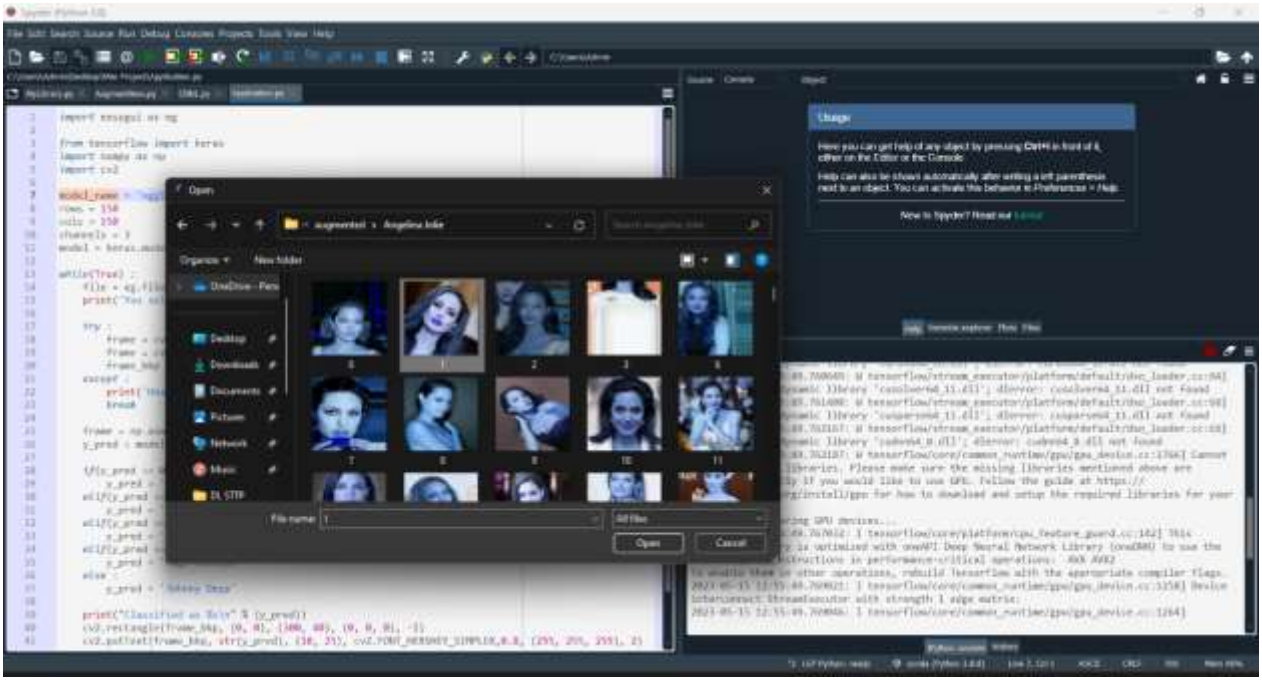
5. Healthcare Applications: Face recognition holds promise in healthcare. It can aid in patient identification, monitoring, and tracking. Additionally, it can assist in diagnosing certain medical conditions by analyzing facial features and expressions, such as detecting signs of pain or neurological disorders.

6. Social Media and Photography: Face recognition algorithms can be utilized in social media platforms to enhance photo tagging and organization. They can automatically identify individuals in photos and suggest tags, making it easier to search and share images. Furthermore, face recognition can be used to enhance image editing tools and create realistic facial manipulations.

7. Enhanced Customer Experience: Face recognition can enhance customer experience in various industries, such as hospitality, retail, and entertainment. It can enable personalized greetings, targeted offers, and streamlined check-in processes, improving customer satisfaction and loyalty.

8. Crowd Management and Public Safety: Face recognition can aid in crowd management and public safety scenarios. It can help monitor and identify individuals in large gatherings, airports, stadiums, and transportation hubs, enabling early detection of potential threats or wanted individuals.

SCREENSHOT:




Console 1/A
2023-05-15 12:55:49.762167: W tensorflow/stream_executor/platform/default/dso_loader.cc:64]
Could not load dynamic library 'cudnn64_8.dll'; dlerror: cudnn64_8.dll not found
2023-05-15 12:55:49.762187: W tensorflow/core/common_runtime/gpu/gpu_device.cc:1766] Cannot
dlopen some GPU libraries. Please make sure the missing libraries mentioned above are
installed properly if you would like to use GPU. Follow the guide at https://
www.tensorflow.org/install/gpu for how to download and setup the required libraries for your
platform.
Skipping registering GPU devices...
2023-05-15 12:55:49.767032: I tensorflow/core/platform/cpu_feature_guard.cc:142] This
TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the
following CPU instructions in performance-critical operations: AVX AVX2
To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.
2023-05-15 12:55:49.769021: I tensorflow/core/common_runtime/gpu/gpu_device.cc:1258] Device
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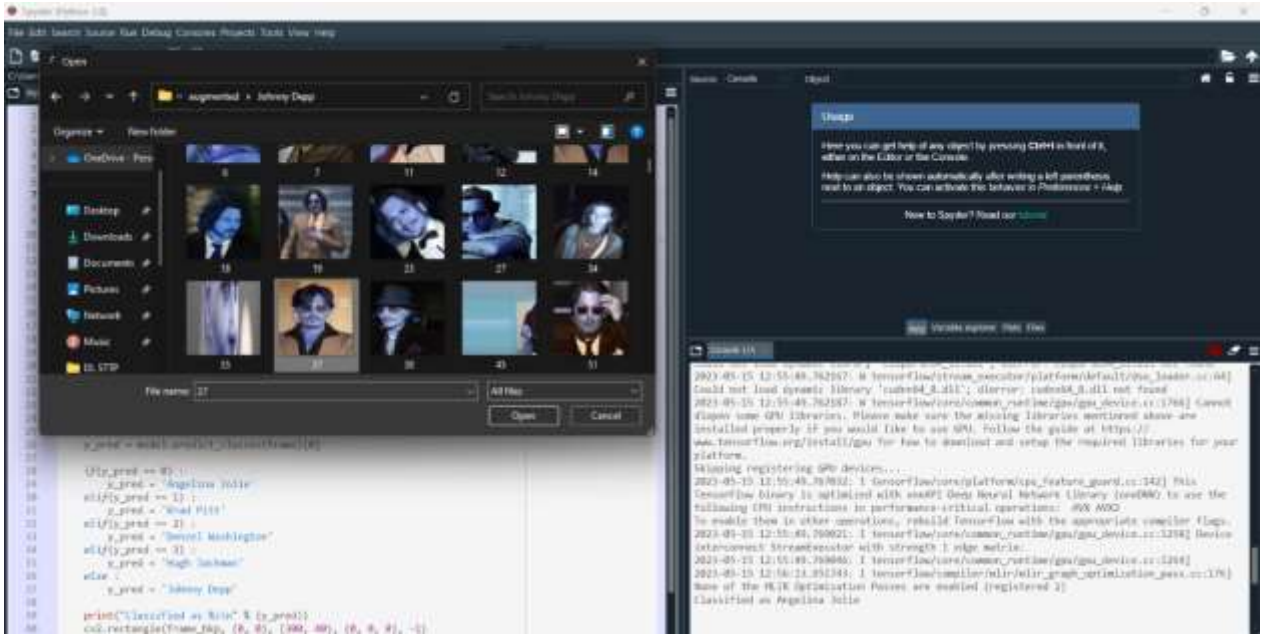
2023-05-15 12:56:13.951743: I tensorflow/compiler/mlir/mlir_graph_optimization_pass.cc:176]
None of the MLIR Optimization Passes are enabled (registered 2)
Classified as Angelina Jolie



CONCLUSION:

In this, we have implemented the system for Human Face Recognition.

REFERENCES:

1. https://www.geeksforgeeks.org/vgg-16-cnn-model/