Deep Learning And Perception Project Report

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Project Report

Face Mask Detection

https://colab.research.google.com/drive/1vbD_M-YuRAiV5jQeGtifcQ57FejooPXp?usp=sharing

Introduction

With the emergence of the COVID-19 pandemic, the use of face masks has become a crucial preventive measure to reduce the spread of the virus.. In this project, we developed a face mask detection system using deep learning techniques to automatically detect whether individuals are wearing masks correctly or not.

Objectives

Develop a deep learning model capable of accurately detecting faces and distinguishing between individuals wearing masks and those who are not.

Technologies and Tools:

- **Convolutional Neural Networks (CNNs): One of popular CNN Architecture ,ResNet Model has being applied.**
- **Image Processing: Implement preprocessing techniques such as image augmentation, normalization, and resizing to enhance model performance.**
- **Deep Learning Frameworks: Using popular deep learning frameworks such as TensorFlow for model development and training.**

Image Processing Workflow

The workflow for processing the images involves the following steps:

- **Resize Image: The image is resized to a dimension of 128x128 pixels to maintain uniformity across the dataset.**

- **Convert to RGB: Each image is converted to RGB format to ensure a standard color representation.**
- **Convert to NumPy Array: The processed image is converted from a PIL Image object to a NumPy array which is crucial for compatibility with TensorFlow.**

Train-Test Split Process

The dataset was divided into two subsets:

- **Training Set: 80% of the data (X_train, Y_train). This set is used to train the machine learning model, allowing it to learn from the features and establish patterns.**
- **Test Set: 20% of the data (X_test, Y_test). This set is kept separate from the training process and is used to evaluate the model's performance.**

Scaling:-

Scaling or normalizing data helps to bring all feature values to a similar range, which helps improve the convergence and performance of machine learning models

```
X_train_scaled=X_train/255
```

X_test_scaled = X_test/255

Model Design:-

The model is designed with the following components.

Pre-trained Base Model:

The base model is ResNet152V2, a deep convolutional neural network trained on the ImageNet dataset.

Custom Fully Connected Layers:

After flattening the base model's output, the custom model includes a series of dense layers:

The first dense layer has 256 units, followed by batch normalization and dropout to reduce overfitting.

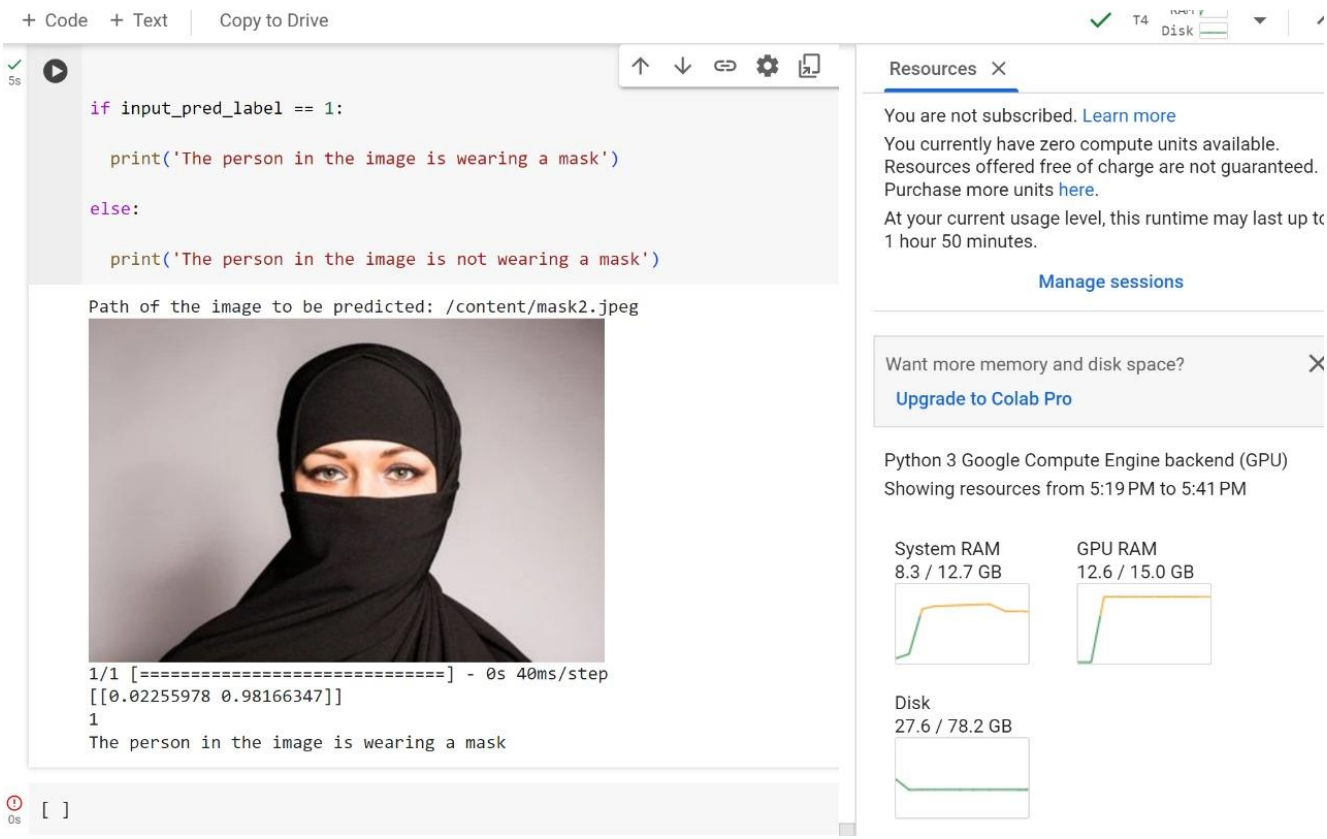
Subsequent dense layers have fewer units (128 and 64), with additional batch normalization and dropout layers in between.

This structure aims to allow for effective feature extraction and reducing overfitting risks.

Output Layer:

The final layer has 2 units with a sigmoid activation function, appropriate for binary classification. The output represents the probability of each class, allowing for easy interpretation of results.

The Results:


+ Code
+ Text
Copy to Drive
T4
Disk
5s
if input_pred_label == 1:
print('The person in the image is wearing a mask')
else:
print('The person in the image is not wearing a mask')
Path of the image to be predicted: /content/mask2.jpeg
1/1 [==============================] - 0s 40ms/step
[[0.02255978 0.98166347]]
1
The person in the image is wearing a mask
0s
[ ]
Resources
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1 hour 50 minutes.
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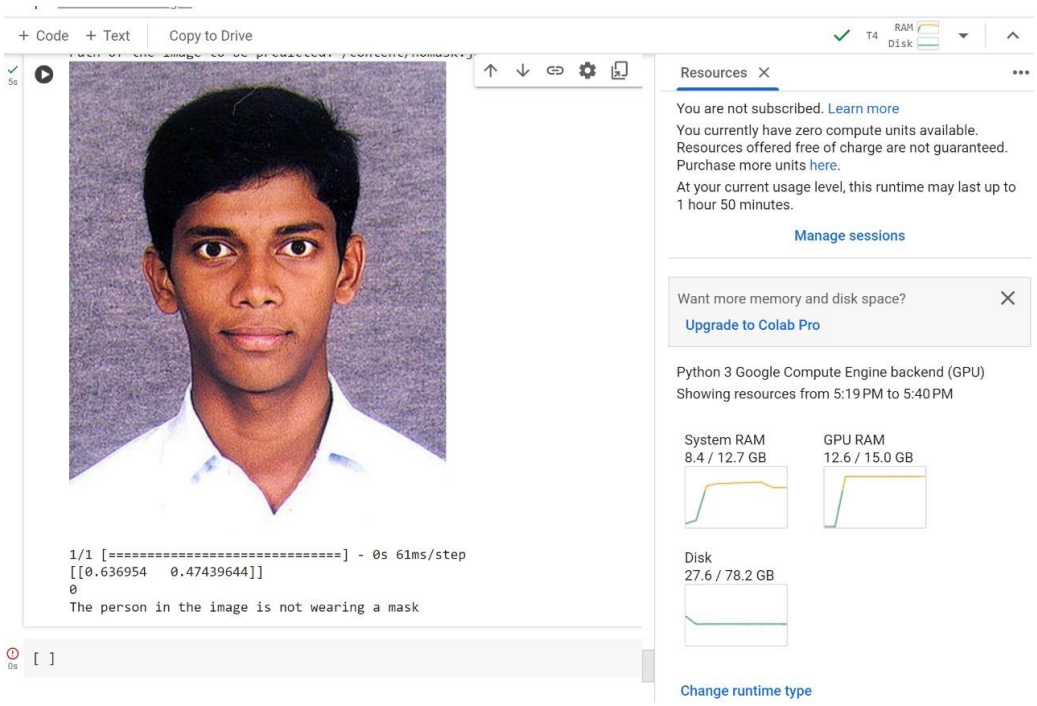
Showing resources from 5:19 PM to 5:41 PM
System RAM
8.3 / 12.7 GB
GPU RAM
12.6 / 15.0 GB
Disk
27.6 / 78.2 GB


+ Code
+ Text
Copy to Drive
T4
RAM
Disk
1/1 [==============================] - 0s 61ms/step
[[0.636954 0.47439644]]
0
The person in the image is not wearing a mask
[ ]
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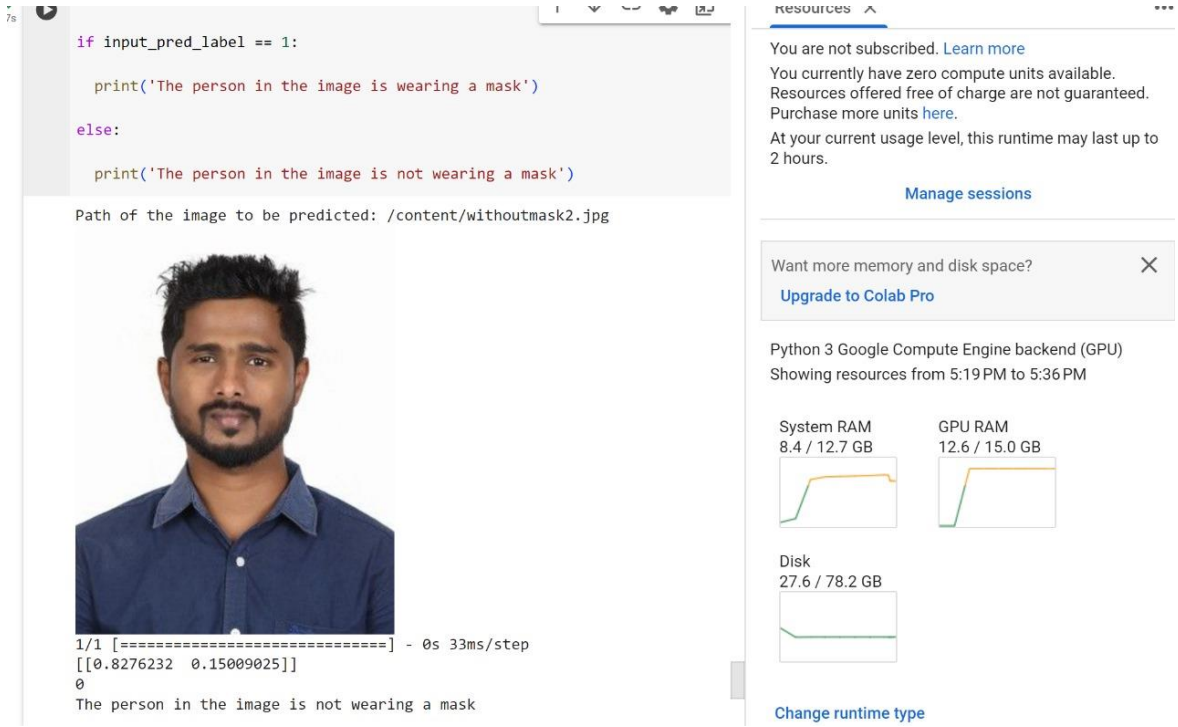
8.4 / 12.7 GB
GPU RAM
12.6 / 15.0 GB
Disk
27.6 / 78.2 GB
Change runtime type


if input_pred_label == 1:
print('The person in the image is wearing a mask')
else:
print('The person in the image is not wearing a mask')
Path of the image to be predicted: /content/withoutmask2.jpg
1/1 [==============================] - 0s 33ms/step
[[0.8276232 0.15009025]]
0
The person in the image is not wearing a mask
Resources
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System RAM
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GPU RAM
12.6 / 15.0 GB
Disk
27.6 / 78.2 GB
Change runtime type

```
[39]
print(input_prediction)

input_pred_label = np.argmax(input_prediction)

print(input_pred_label)

if input_pred_label == 1:

  print('The person in the image is wearing a mask')

else:

  print('The person in the image is not wearing a mask')
```

```
Path of the image to be predicted: /content/maskman.jpeg
```

```
1/1 [==============================] - 4s 4s/step
[[0.00594704 0.99794465]]
1
The person in the image is wearing a mask
```

```
input_image_path = input('Path of the image to be predicted: ')
```

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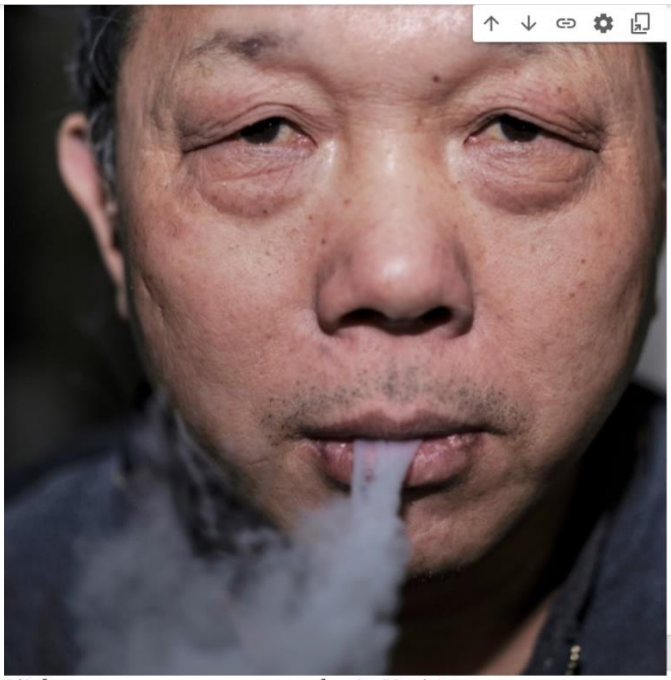
GPU RAM
12.6 / 15.0 GB

Disk
27.6 / 78.2 GB

Change runtime type



```
1/1 [==============================] - 0s 52ms/step
[[0.979447   0.02929241]]
0
The person in the image is not wearing a mask
```

Resources

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