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Face Mask Detection Workshop

Face Mask Detection Using Computer Vision

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Face Mask Detection – How Do We Start?

Loading Image Data

```
array([[248, 248, 248],
       [248, 248, 248],
       [248, 248, 248],
       ...,
       [247, 248, 246],
       [247, 248, 246],
       [247, 248, 246]], dtype=uint8)
```

- The steps begin from loading the image data
- The data could either be an image or a video
- In case of a video, the computer reads it frame by frame, which is nothing but images from the video

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Loading Image Data

01 Method to Read Image

- OpenCV method reads the image
- Since it is a one-dimensional array, it needs a method to display it as well

02 Method to Display Image

- The method will display the image
- But, it needs a window and wait key to display the image

03 Resizing Image

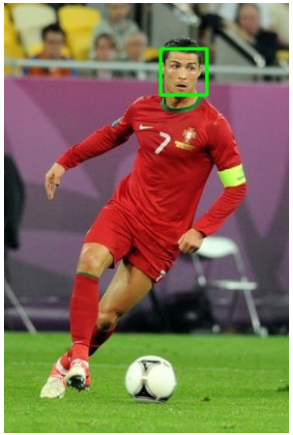
- Resizing the image to your best liking using resize methods
- We need resizing, as it helps adjust the image to fit the window

04 Video Frames

- Since the video is read in frames, each frame is iterated upon as a separate image

Face Mask Detection

Feature Detection



- We will detect features like face, nose, eyes, etc.
- Extract a region of interest from the image

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Face Mask Detection

Feature Detection

01 Cascade Classifier

- Cascade classifier is trained with positive and negative samples
- It is used to detect ROI in an image

02 Haarcascade

- Haar Cascade is a machine learning based approach
- It is used to detect objects in an image

03 XML Files

- XML files are present in the OpenCV directory
- These files can be used for feature detection

04 ROI

- ROI or Region of interest, as the name suggests, is the most prominent part of the image
- In Face detection, ROI is the Face

Face Mask Detection

Training a Classifier with Labelled Data

Source: pyimagesearch.com

- We will train a classifier with labelled data
- The labels will be decisive: Either a person wears a mask or does not
- This classifier will later be used during the real-time detection

Face Mask Detection

Training a Classifier with Labelled Data

01 Dataset

- The sample dataset contains two sets
- With mask, without mask with respective labels

02 Preprocess the Image

- The image is pre processed to fit the network
- Shape and other parameters are optimized according to the model

03 MobileNetV2

- MobileNetV2 is a convolutional neural network
- They are small and provide low latency

04 Training

- The model is trained for several epochs
- The basic idea is to get the maximum accuracy

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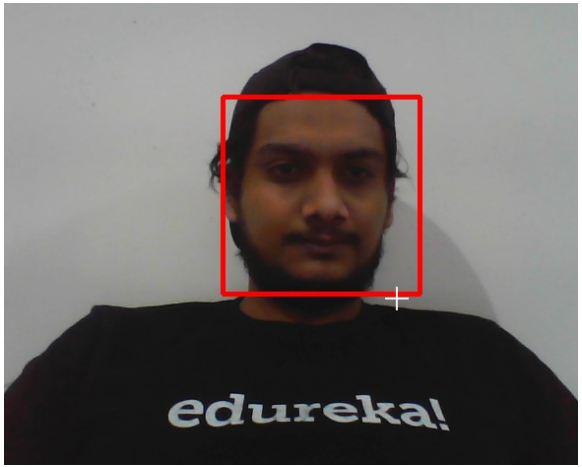
Face Mask Detection

Video Streaming & Real Time Face Detection



- The idea is to use the webcam of the computer
- The video stream will start using OpenCV
- While the stream goes on, the feature detection must take place simultaneously

Face Mask Detection

Video Streaming & Real Time Face Detection

01 Method to Capture Video

- A method to capture the video
- The video is read in frames

02 Looping through the Frames

- The frames are iterated upon
- The idea is to extract the ROI from the images

03 Video Streaming

- A window will be open with the frames in sync
- The frames will play for a specified amount of time

04 Detecting Faces in Real Time

- The face is detected in real time
- The ROI will have a rectangle enclosed in the video stream

Face Mask Detection

Using the Trained Model on Each ROI

- Now, we will load the classifier that we trained on labelled data
- The extracted ROI will be given to the model
- The classifier will give a categorical output based on accuracy

Let Us Build a Face Mask Detection Model

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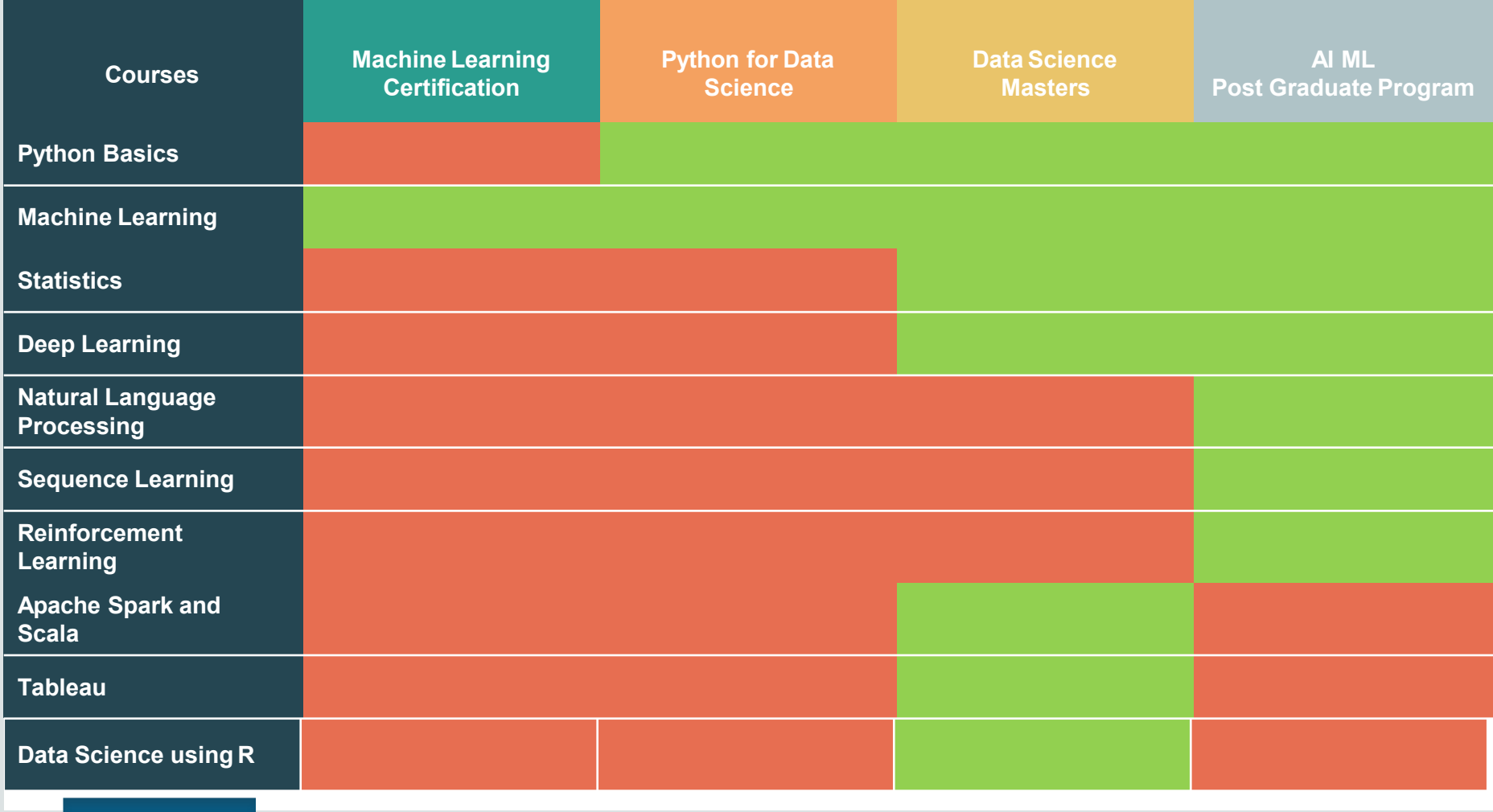

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