**FINAL YEAR PROJECT**

**Student Detail.**

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**Broad area:** Machine Learning

**Proposed Topic :** Face mask detection by training neural networks using machine learning.

**Summary of the proposal :**

After the breakout of the worldwide pandemic COVID-19, there arises a severe need of protection mechanisms, face mask being the primary one. The basic aim of the project is to detect the presence of a face mask on human faces on live streaming video as well as on images. Since mask detection is part of object detection, we introduce it first. Object detection is one of the trending topics in the field of image processing and computer vision. Ranging from small scale personal applications to large scale industrial applications, object detection and recognition is employed in a wide range of industries. Some examples include image retrieval, security and intelligence, OCR, medical imaging and agricultural monitoring.

This project is based on broad topic machine learning and artificial intelligence as this project explores the sub-domains of Al, concepts of computer vision using the OpenCV library and Keras. In this project, we will be developing a face mask detector that is able to distinguish between faces with masks and faces with no masks. We have proposed a detector which employs Single Shot Multi-box Detector (SSD) for face detection and a neural network to detect presence of a face mask. All the images are actual images extracted from Kaggle datasets and RMFD dataset. From the sources, the proportion of the images is equal.

The main steps involved the project is as follow.

* **Step 1:** Extraction face data for training. Here we will extract the image data to our project from our system/pc. After extraction, we need to visualize data to find the count of masked and unmasked dataset.
* **Step 2:** Train the classifier to classify faces in mask or labels without a mask. Here we will train the classifier using neural networks.
* **Step 3:** Detect faces while testing data using SSD face detector. Here we create a separate dataset called test dataset to evaluate the model.
* **Step 4:** Using the trained classifier, classify the detected faces. Here classifier is revoked to verify that image is masked or unmasked.

In our approach, we will dedicate 80% of the dataset as the training data and the remaining 20%as the testing data, which will make the split ratio as 0.8:0.2 of train to test set. Since split ratio is high, we expect the better results.

**Importance of the proposed project in the context of current status (within 200 words ):**

As the virus outbreak continues, there is the need of coming up with innovative digital solutions. One of them is a face mask detection system to identify people with face masks. Covering our faces with a mask has become a new normal amidst the pandemic, as face masks are effective in preventing the virus outbreak. Many developed and underdeveloped nations worldwide have made it compulsory for people to wear masks if leaving home or visiting public places. Other precautionary measures are also advocated by the government to maintain safety and hygiene, apart from shielding faces. Further, millions of people are learning to make their own face masks due to the short supply of masks in the market. On the other hand, it will be challenging to recognize faces with masks on any monitoring systems, while maintaining touchless access control in buildings. Covering faces with masks has posed a challenge for face detection algorithms and performance.