Project Proposal

Face Mask Detection for Covid-19

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The Covid-19 pandemic is causing a global health crisis. Until a vaccine is discovered, one of the effective protections is wearing a face mask and is highly recommended by World Health Organization (WHO) and Center for Disease Control (CDC). However, it is not feasible to manually track the implementation of mask policy. Hence, introducing Deep Learning based system and FaceMaskNet network which can detect masked, unmasked and improperly masked faces, called Face Mask Detection (FMD).

The FMD will help to ensure that strict face mask guidelines are being followed, a safe environment is maintained and to track safety violations. This is increasingly important to curb the scope of the virus and in smart hospitals for effective patient care. Not too many implementations are there in this specific area and it makes the problem statement interesting. This problem gives us scope to explore multiple approaches to build an efficient face mask detection model which are crucial especially in densely populated areas, residential areas, large scale manufacturers, hospitals and other enterprises to ensure safety.

In order to proxy this problem, we are using the Real-world masked face recognition dataset (RMFRD). It contains 5,000 masked faces of 525 people and 90,000 normal faces. Masked Face Detection Dataset (MFDD) contains ~24,000 images. Simulated Masked Face Recognition Dataset (SMFRD) contains ~500,000 images. This can be extended to video data for making it more realistic and useful. The hardest part is detecting whether mask has been worn incorrectly or not once both the face and mask are identified in the image.

The face mask detection (FMD) approach consists of two main components, the first component is the training stage where transfer learning or deep convolutional neural network can be used to train the dataset. We can also experiment training different models and pick the best one. The second component is Face mask detection stage to which the input is either an image or video, where a face is extracted from the image using an object detection model, and then extracted face or feature is sent to the trained model for classification.

In the face mask detection (FMD) approach, different models will be explored using variety of architectures to get the best results. However, we are not definite about the accuracy of the model right now.

We know that there have been increased number of data science use cases for the covid-19 situation. Most of them are concentrated in predicting the number of cases, patterns, mortality rate etc., but this approach is not widely explored. This is one important approach that can be employed in various sectors for effective health and safety monitoring. This approach can be integrated with social distancing detector as part of future scope.

Reference:

1. https://github.com/X-zhangyang/Real-World-Masked-Face-Dataset
2. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3663305