

Paper Review 02

Face Mask Detection using Convolutional Neural Network (CNN) to reduce the spread of Covid-19

Md. Alahi Almin Tansen (190321028)

Department of Computer Science and Engineering, European
University of Bangladesh

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Purpose of This Research

This research is done to develop a face mask detection system to prevent COVID-19 spread. The study used three different methods, including Max pooling, Average pooling, and MobileNetV2 architecture. Authors used 1845 images including 120 co-author pictures. The study aims to contribute to the healthcare sector's efforts to prevent the spread of COVID-19 by providing an accurate face mask detection system.

Proposed System

The paper proposes a system for face mask detection that involves several steps. The first step is data collection, followed by data preprocessing and augmentation. Next, the system uses different CNN methods, including convolution layer with max pooling, average pooling, and MobileNetV2, for classification. The system then proceeds to the detection output step and performance evaluation, where precision, recall, accuracy, and F1-score are measured. The proposed system aims to detect face masks accurately using deep learning-based methods and provides a comprehensive performance evaluation of the system.

Architecture

In this research, CNN architecture is used for image processing and classification. The architecture consists of two convolution layers, which aim to find effective features inside an image. Max pooling and Average pooling are used to reduce the complexity of input representation.

The first CNN model initiates with input image then hidden layer the Relu activation is used, followed by Max pooling Three times also flatten is used followed by fully connected dense layer Softmax activation is done in the output layer. Authors used similar approaches towards Average pooling layer where both of those model used Adam optimizer.

Another architecture MobileNetV2 is used. In this research authors removed base layer and added new trainable one. Authors used ResNet – 10 architecture OpenCV as base model. They take care of the overfitting problem by dropout layer while using OpenCV's Caffemodel. As they are freezing the pretrained model new trainable layer is used as head layer over the base model then train the new layer on the dataset.

Experimental Procedure

Researcher used two datasets, that includes 1965 images. Using Max pooling, Average pooling & MobileNetV2 there are 13 epochs to get the best possible result of training accuracy of 96.49% and validation accuracy of 98.67% in Max pooling. In Average pooling 95.19% training accuracy and 96.23% validation accuracy. In MobileNetV2 architecture significantly improved accuracy of 99.72% for training and 99.82% for validation. Here we observed that authors found the MobilenetV2 architecture is successful to get the best possible result among other two. A confusion matrix was also measured after using MobileNetV2 architecture. Overall, the study demonstrates the effectiveness of using deep learning-based methods, to achieve the best possible accurate and efficient detection of face masks in images and videos.

Future Plan

The researcher plan to work with wider dataset in order to compare with MobileNetV2. They also planned to integrate the model with IoT for future work plan.

References

1. [Face Mask Detection using Convolutional Neural Network \(CNN\) to reduce the spread of Covid-19 by FM Javed Mehedi Shamrat, Sovon Chakraborty, Md Masum Billah, Md Al Jubair, Md Saidul Islam, Rumesh Ranjan](#)