Realtime Face Mask Detection using Deep Learning

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Introduction

- Installation of Face mask detection systems in various places such as public places, industries, mining fields etc. is necessary to reduce the number of casualties by preventing the transmission of contagious diseases, ensuring that people enter dangerous environments with proper protection and many other ways.

- Traditional way of performing face mask detection is a manually intensive process. Thus, an automated system is required which can perform face mask detection using minimum number of resources and that too, with high accuracy and high success rate.

- So, in this project, a face mask detection system is proposed which can automatically detect face masks using deep learning and image processing techniques.

Problem Statement

To create a face mask detection system which can perform automatic and real-time face mask detection using deep learning and image processing techniques.

Objectives

- To create or collect a proper dataset for the project
- To train a deep learning model to identify whether a person is wearing a mask or not.
- To add a facility to perform face mask detection on an image.
- To add a facility to perform face mask detection on a local video.
- To add a facility to perform face mask detection on a real time video stream.

Dataset description

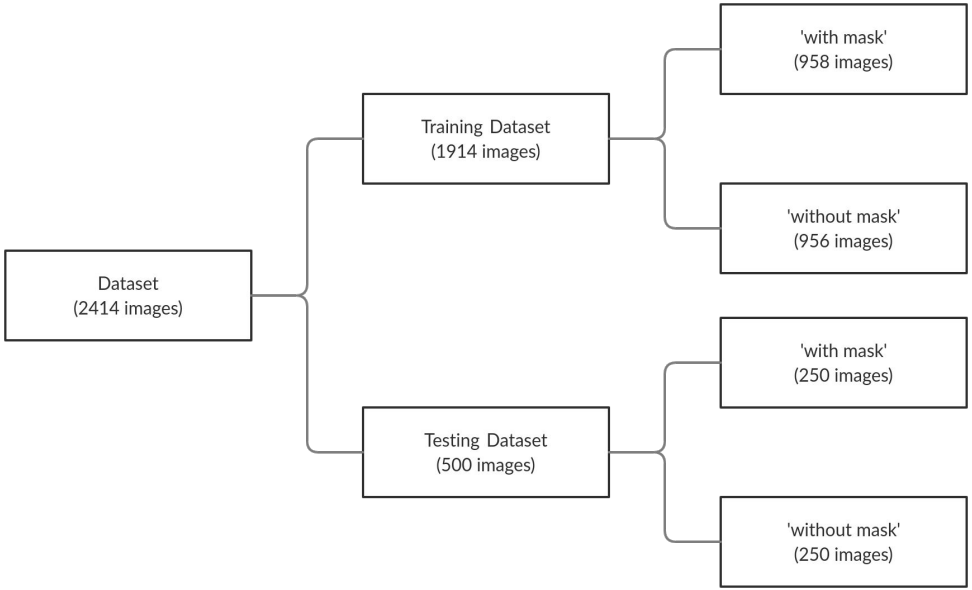


Fig 1: Structure of dataset

Dataset description

Fig 2: Samples from dataset

Methodology

Part 1: Creation and training of face mask detection model

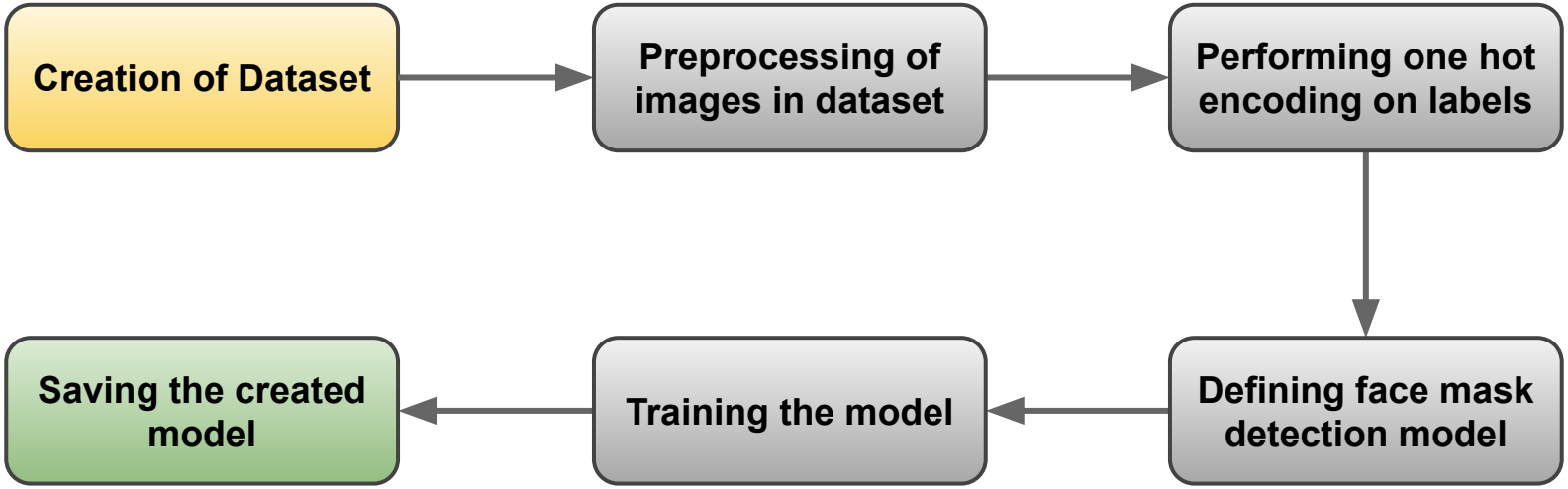


Fig 3: Flowchart to create and train the model

Methodology (Contd.)

Part 2.1: Performing face mask detection on images

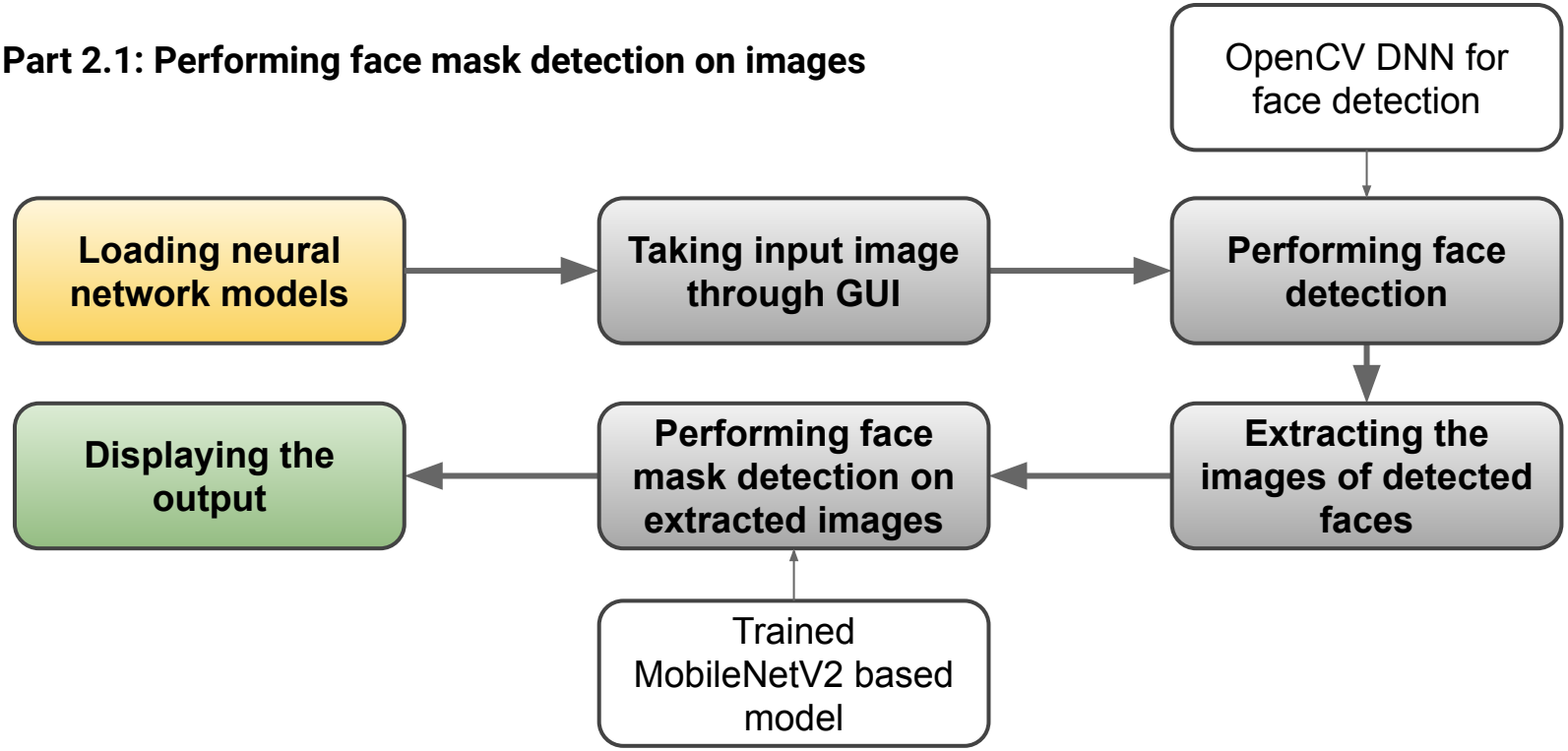


Fig 4: Flowchart to detect face masks in images

Methodology (Contd.)

Part 2.2: Performing face mask detection on real-time/ local videos

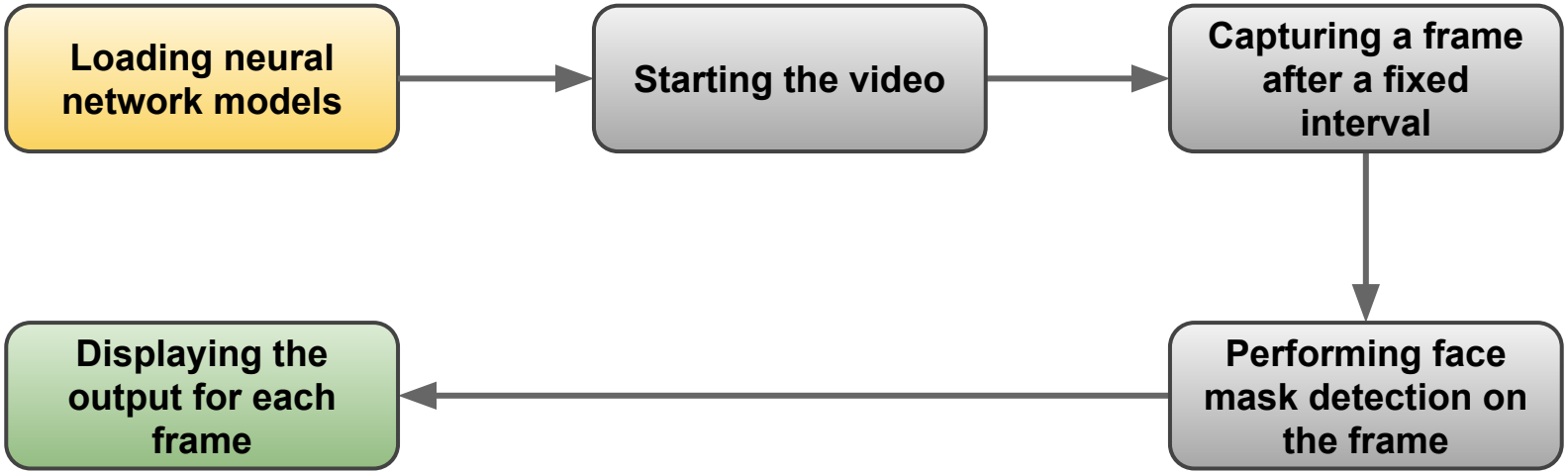


Fig 5: Flowchart to detect face masks in real-time/ local videos

Results and Analysis

- The model achieved an accuracy of 99.52% while training on the training dataset and an accuracy of 99% while testing using the testing dataset which is quite good.

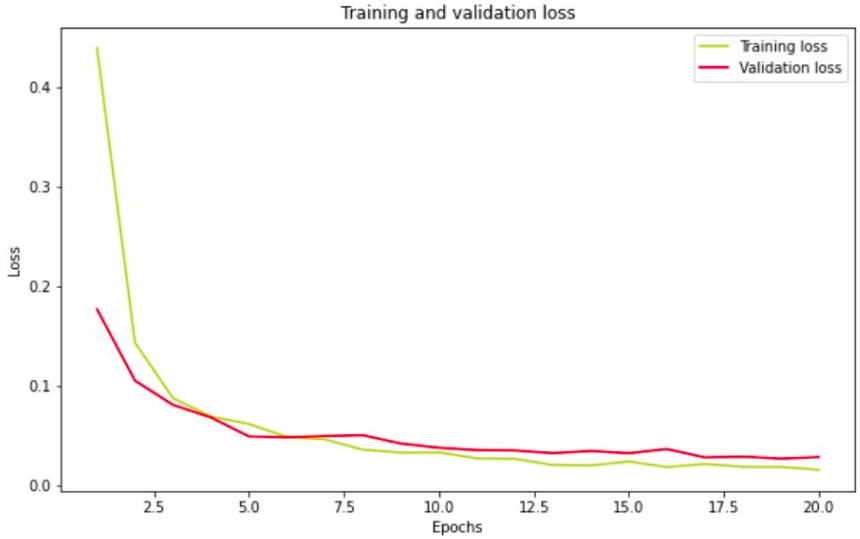
MODEL EVALUATION

	precision	recall	f1-score	support
with_mask	1.00	0.98	0.99	250
without_mask	0.98	1.00	0.99	250
accuracy			0.99	500
macro avg	0.99	0.99	0.99	500
weighted avg	0.99	0.99	0.99	500

Fig 6: Classification report (Model evaluation)

Results and Analysis (Contd.)

- As the number of epochs increase, the loss decreases dramatically and converges after a certain point while the accuracy increases at the same time. This shows that the model has trained well.



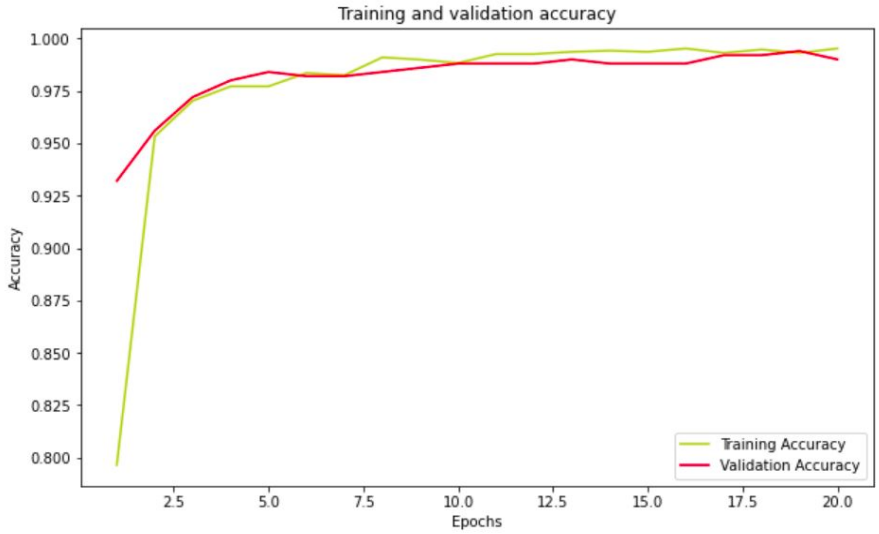


Fig 7: Evaluation graphs

Results and Analysis (Contd.)

Fig 8: Performing Face mask detection on images

Results and Analysis (Contd.)

Fig 9: Performing Face mask detection on local video

Results and Analysis (Contd.)

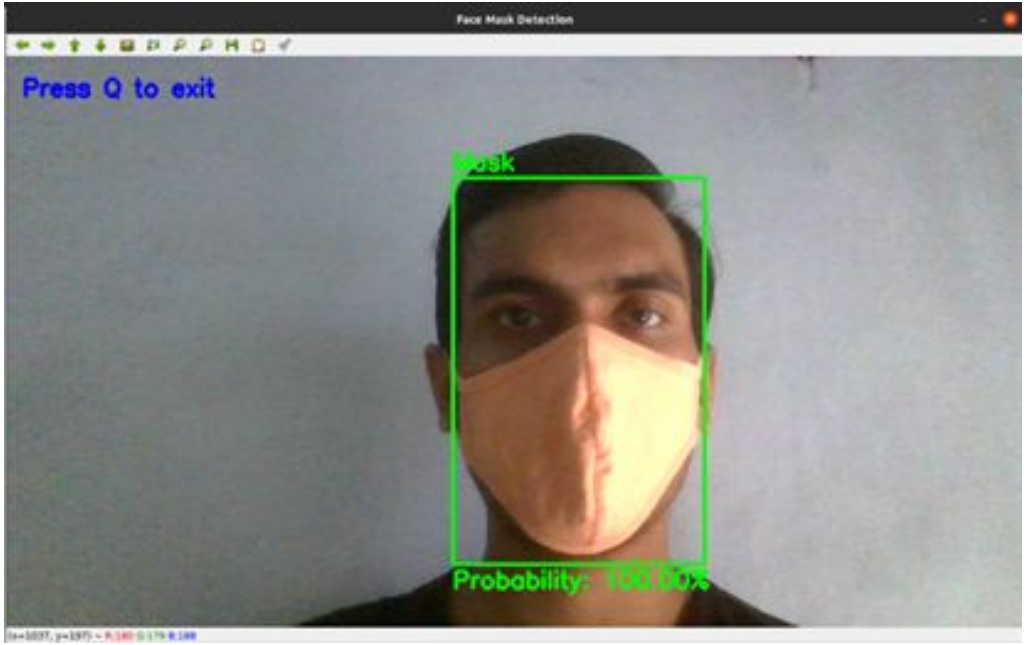


Fig 10: Performing Face mask detection on real time video stream

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Thank You!!

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