# Chapter 1

# Introduction

## 1.1 Introduction

Introduction Rapid advancements in the fields of Science and Technology have led us to a stage where we are capable of achieving heights that seemed improbable a few decades ago. Technologies in fields like Machine Learning and Artificial Intelligence have made our lives easier and provide solutions to several complex problems in various areas. Modern Computer Vision algorithms are approaching human-level performance in visual perception tasks. This pandemic is something no one saw coming. Covid-19 has defined a new normal for the world where face mask plays a major role. To keep the world safe and healthy it is our duty to wear masks. For organizations which work on large scale to check for each individual whether he/she has worn a mask will be a tedious job. To solve this problem, we are Face Mask Detector. This system can be integrated with an image or video capturing device like camera, to track safety violations, promote the use of face masks, and ensure a safe working environment.

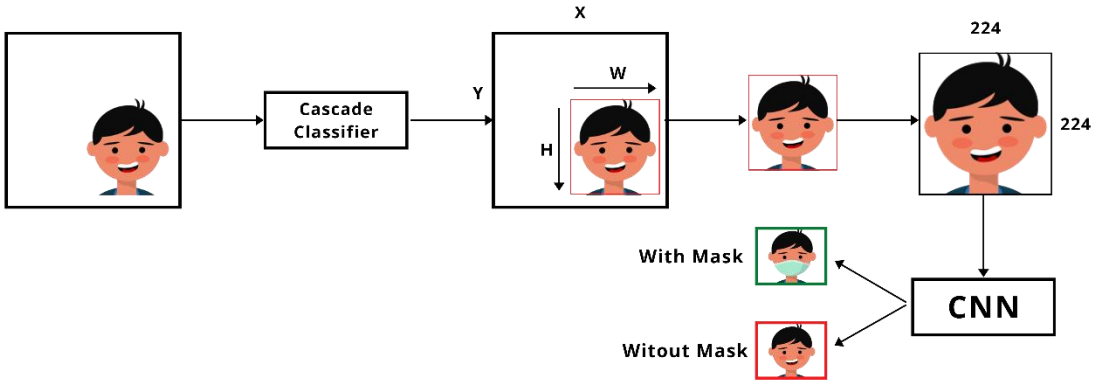


**Figure 1.1: Overview of our system**

## 1.2 Aim & Objectives

The Face Mask Detector is quite an important system for organisations to be safe and work with less man power. This project aims to detect whether a person is wearing a mask or not. It is based on Machine Learning and Convolution Neural Networks and is implemented in Python using Keras and OpenCV. The main objective of our project is to focus on the major problem the entire world is facing currently. Machine Learning as being our domain, will help train the

system for better and accurate results. OpenCV will help in accessing the camera which plays an important role in running our system. MobileNetV2 is a Convolutional Neural Network that is small, low power model with a size of 17 MB that can be used for classification, detection and other common tasks especially related to images.

## 1.3 Scope

The proposed system can be of great importance at public places to detect people without masks. A person's data can be captured as videos in the system at the entrance. Any person found to be without a face mask, an alarm alerting at the specific place is sent so that they could take quick action. If the person in charge is not present on the location of entrance, a message can be sent to the person alerting him/her for action. You can customize the face mask detection system based on your business requirement.

# Chapter 2

# Review Of Literature

## 2.1 Domain Explanation

The Machine Learning (ML) approach applies ML algorithm and uses linguistic features with the aim of optimizing the performance of the system using example data. The big data framework such as Mahout and Pentaho contain library and plugins for the ML approach which can be executed to perform the sentiment classification. In the context of big data analysis, a user should determine the type of algorithm that would be applied for the data at hand and such algorithm is executed through big data analytics tools for specific problem-solving purposes, such as predictive analytics. Typically, two sets of documents are required in an ML-based classification. These documents are the training and testing sets. A training set is used by the classifier to learn the document characteristics, whereas a testing set is used to validate classifier performance. The text classification methods using the ML approach can be divided into supervised and unsupervised learning methods. The supervised methods use a large number of labelled training documents. The unsupervised methods are used when these labeled training documents are difficult to find. The supervised methods achieve reasonable effectiveness but are usually domain specific and language dependent and they require labelled data, which is often labor intensive. Meanwhile, the unsupervised methods have high demand because publicly available data are often unlabeled and thus require robust solutions. Therefore, semi-supervised learning has been introduced and has attracted considerable attention in sentiment classification. In unsupervised learning, it uses a large amount of unlabeled data along with labelled data to build better learning models. Within the machine learning approach, a series of feature vectors are chosen and a collection of tagged corpora are provided for training a classifier, which can then be applied to an untagged corpus of text. Most commonly a variety of unigrams or n-grams are chosen as feature vectors.

## 2.2 Existing Solutions

The existing solution of our system was mainly manual. When the covid-19 hit our country, none of us were prepared for it and hence to take precautions was the need of the hour. To check if a person is wearing a mask or not before entering any organisation or public area, a person had to be present at the entrance who kept an eye on every individual not wearing a mask. The accuracy of this situation decreased as the masses increased. Our system works with a camera and can be installed at every corner and entrance of any public area or at the entrance of any organisation.

## 2.3 Hardware And Software Requirements

### 2.3.1 HARDWARE REQUIREMENTS

- Desktop computer / Laptop with minimum 2GB RAM,
- stable and fast internet connection ,
- Core i3 / i5/ i7 processor.
- External camera / Inbuilt web camera.
- Sufficiently large storage for Database storage.

### 2.3.2 SOFTWARE REQUIREMENTS

- Windows 8 or better
- tenserflow>=2.5.0*
- keras==2.4.3
- imutils
- numpy
- opencv-python
- matplotlib
- argparse
- scipy
- scikit
- pillow
- streamlit

## 2.4 Dataset Description

The data set we are using is for our project is downloaded from kagel. As our project focuses on a person's face we have 4095 pictures which is divided into two categories. First category is face with mask and second is face without mask. We have 2165 pictures of face with mask and 1930 pictures of face without mask.

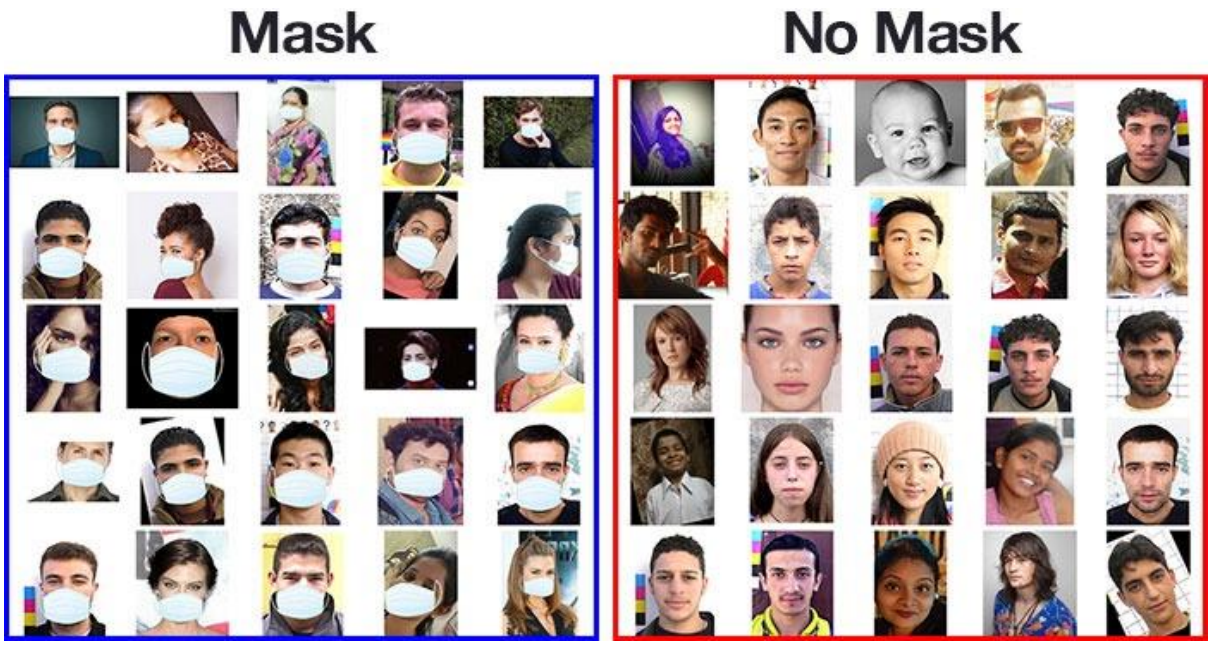


**Figure 2.1: Example of our dataset**