

FACE MASK DETECTION USING ARTIFICIAL INTELLIGENCE

Abstract— COVID-19 pandemic caused by novel coronavirus is continuously spreading until now all over the world. The impact of COVID-19 has been fallen on almost all sectors of development. The healthcare system is going through a crisis. Many precautionary measures have been taken to reduce the spread of this disease where wearing a mask is one of them. In this paper, we propose a system that restrict the growth of COVID-19 by finding out people who are not wearing any facial mask in a smart city network where all the public places are monitored with Closed-Circuit Television (CCTV) cameras. While a person without a mask is detected, the corresponding authority is informed through the city network. A deep learning architecture is trained on a dataset that consists of images of people with and without masks collected from various sources. The trained architecture achieved 98.7% accuracy on distinguishing people with and without a facial mask for previously unseen test data. It is hoped that our study would be a useful tool to reduce the spread of this communicable disease for many countries in the world

INTRODUCTION

A new strain which has not previously been identified in humans is novel coronavirus (nCoV). Coronaviruses (CoV) are a wide group of viruses which cause illness that range from colds to deadly infections like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [1]. The first infected patient of coronavirus has been found in December 2019. From that period, COVID-19 has become a pandemic all over the world [2]. People all over the world are facing challenging situations due to this pandemic. Every day a large number of people are being infected and died. At the time of writing this paper, almost 16,207,130 infected cases have been confirmed where 648,513 are death [3]. This number is increasing day by day. Fever, dry cough, tiredness, diarrhea, loss of taste, and smell are the major symptoms of coronavirus which is declared by the World Health Organization (WHO) [4]. Many precautionary measures have been taken to fight against coronavirus. Among them cleaning hands, maintaining a safe distance, wearing a mask, refraining from touching eyes, nose, and mouth are the main, where wearing a mask is the simplest one

COVID-19 is a disease that spread from human to human which can be controlled by ensuring proper use of a facial mask. The spread of COVID-19 can be limited if people strictly maintain social distancing and use a facial mask. Very sadly, people are not obeying these rules properly which is speeding the spread of this virus. Detecting the people not obeying the rules and informing the corresponding authorities can be a solution in reducing the spread of coronavirus.

A face mask detection is a technique to find out whether someone is wearing a mask or not. It is similar to detect any object from a scene. Many systems have been introduced for object detection. Deep learning techniques are highly used in medical applications [5], [6]. Recently, deep learning architectures [7] have shown a remarkable role in object detection. These architectures can be incorporated in

detecting the mask on a face. Moreover, a smart city [8] means an urban area that consists of many IoT sensors to collect data. These collected data are then used to perform different operations across the city. This includes monitoring traffic, utilities, water supply network, and many more. Recently, the growth of COVID-19 can be reduced by detecting the facial mask in a smart city network.

This paper aims at designing a system to find out whether a person is using a mask or not and informing the corresponding authority in a smart city network. Firstly, CCTV cameras are used to capture real-time video footage of different public places in the city. From that video footage, facial images are extracted and these images are used to identify the mask on the face. The learning algorithm Convolutional Neural Network (CNN) is used for feature extraction from the images then these features are learned by multiple hidden layers. Whenever the architecture identifies people without face mask this information is transferred through the city network to the corresponding authority to take necessary actions. The proposed system appraised promising output on data collected from different sources. We also represented a system that can ensure proper enforcement of the law on people who are not following basic health guidelines in this pandemic situation.