Face Mask Detection & Attendance System

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DOI: 10.29322/IJSRP.11.03.2021.p11140
http://dx.doi.org/10.29322/IJSRP.11.03.2021.p11140

Abstract- The Current COVID-19 pandemic has got the world to a halt and took everyone's attention, as it was a global pandemic the world knew about it. But some underdeveloped nations suffer from viral outbreaks every year. To protect ourselves from these viral outbreaks there is a need for a continuous supply of Sanitizers and face masks to maintain personal hygiene. To help such nations and give some contribution to the world, a novel idea of Face Mask Detection and Attendance System has been proposed in this paper. Also, the various techniques that can be used for facial recognition and object detection, like the HAAR cascade method, Machine learning Algorithms, Deep Learning, etc. are discussed.

Index Terms-
Face mask-detection, Attendance, Barcode, OpenCV

I. INTRODUCTION

Computer Vision is a part of Computer Intelligence that instructs the data processing machine to learn and interpret the visual world. With the help of a video feed or camera feed from several capturing devices, a computer can precisely detect, examine, identify, and classify objects to respond to what it sees. We can use computer vision to solve many real-life problems. The ongoing COVID-19 pandemic is one such example of an urgent situation that can be addressed using computer vision.

The COVID-19 pandemic is an unparalleled crisis that has affected more than 215 countries across the globe by infecting more than 13 million people and the number is still increasing. To reduce the spread of coronavirus, people often wear masks and sanitize surfaces to protect themselves and it is also mandated by law in several countries. Many workspaces need to have individuals at their offices or workplaces and in such situations work from home won't be possible. The pandemic has also hit the economy of nations and hence opening offices and public transport has become more important. In these tough times, we need to find a solution and way to live or coexist with the virus as no cure or vaccine is available yet and in the near future.

Recalling the outbreak of the Ebola virus, there were many African countries where this outbreak resulted in the downfall of the economy. The economy was slowed down as the average number of employees per business fell by 24%.

In this research and project, the sole purpose is to collect ideas and deploy them in a system that detects whether a person has worn a mask properly or not and also maintain a record of attendance without disturbing the precautionary steps that are being taken for avoiding the spread of COVID-19 virus or any other subsequent diseases. This would play a crucial role in helping countries to maintain strictness and keeping pandemics in control while not disturbing workspaces, productivity, and the safety of individuals.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

To identify and collect data for Face Detection and object detection various techniques are suggested like Deep learning, machine learning, HAAR cascade, and python OpenCV, and the ideas for the research were collected. And to get more vivid ideas, topics were searched online which are related to this domain. After that, ideas were also gathered from a workshop related to PYTHON COMPUTER VISION and its relevant libraries i.e. python's OpenCV library which helps implement the ideas correctly. And there is also an understanding of the scientific and technical terms related to the research work.

1: According to T. Venkat Narayana Rao et al [4], the system converts the image to grayscale and checks for facial features of eyes, nose, and mouth by HAAR cascade. and then based on decision logic. detect facial features and also detect the presence of masks. if the face is detected and if then either any of the face features are not detected, the mask is absent else mask is present. In this proposed system, we get an accuracy of 92.8% with a mask and 97.4% without the mask.

2: According to P. Viola and M. Jones [1], the system uses machine learning to detect objects based on facial features and various algorithms. In this system, the picture is converted to grayscale by eliminating RGB colors and uses rectangles to distinguish edges and identify the facial features this system is named as Viola-jones method. by this system, we get an accuracy of 94.8%, and also it is 15 times faster than any other algorithm. so it consumes very little time to detect facial features.

3: According to Jiang, M., & Fan X [5], the system uses deep learning to identify objects based on certain functions and algorithm, it uses ResNet or mobileNet as backbone Transfer learning and attention mechanism for face and mask detection the proposed system achieves State-of-the-art result on a public face mask dataset, where we get 2.3% and 1.5% higher than the common base result in the face and mask detection.

4: According to Hammoudi et al [3], the system's base method combines HAAR-like features descriptors to detect the face as well as key features of the face from the camera-based acquisition

of a mobile phone; namely detection of eyes, nose, and mouth, the system checks whether a user wore a mask properly or not. this system was implemented and experimented in which it works perfectly.

5: According to the paper by C.Jagadeeswari and M.Uday Theja [2], the system is trained to identify accurately whether a person wore a face mask or not, if not an alarm should be generated by an algorithm that alerts the people around or concerned authority nearby. This system was built on various classifiers from which the ADAM classifier performs very well and accurately.

III. STUDIES AND FINDINGS

For MASK detection :

According to P. Viola and M. Jones [1] as well as T. Venkat Narayana Rao et al [4] and searching online on the web all the ideas were gathered for the research paper. According to this paper, there is a need to use Python's OpenCV library to detect faces, which uses the HAAR-cascade method, or in other words, it can be said that the system will try to compare the Geometry of the face with and without a mask. And to compare that geometry the system will need to neglect the geometry of the nose, mouth, and chin since they are absent while the subject has worn the mask. And when it detects a face with an absence of Nose, mouth, and chin it can be concluded that the person has worn the mask else it's not.

For attendance :

Attendance Management is not yet developed in the mask detection system, it's the idea of the team to add an attendance management system, as it will be more helpful. And it will be a great add-on to the Face-Mask detection System.

After successfully detecting the mask. attendance should be marked. For the attendance purpose, there will be a program to recognize barcodes present on an identity card and if barcode recognizing is successful for a particular person the program will mark attendance for that person in the database else it will show the wrong barcode.

IV. CONCLUSION

In this paper, a novel face mask detector with an attendance system is proposed, which can possibly contribute to public healthcare. However, during this pandemic situation, it is advised that wearing a mask properly can reduce the transmission of such viruses around the globe significantly. And present systems rely on touch which needs to be eliminated given the situation.

The barcodes or RFID tags will be helpful in such pandemic situations that would be attached at the back of each student/employee's ID card which will contain the unique ID of the student/employee and therefore, students will be able to mark his/her attendance by just waving their identity card through the barcode/RFID scanner.

This system can be scaled in the future according to different needs and environments. For example, the image processing could be scaled to identify multiple individuals in a crowd not wearing a mask in the streets.

ACKNOWLEDGMENT

I would like to express my deep gratitude to Professor Ragini Mishra, my research supervisors, for their patient guidance, enthusiastic encouragement, and useful critiques of this research work. I would also like to thank all the faculty from the computer engineering department of SLRTCE, for their advice and assistance in keeping my progress on schedule. I would also like to extend my thanks to the technical staff and faculty of the laboratory of the Computer department for their help in offering me the resources in running the program. I also wish to thank my parents and friends for their support and encouragement throughout my study.

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