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Face Mask Detection Using Tensor Flow JS. and Arduino

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***Abstract*- Coronavirus is continuously spreading until now all over the world. The impact of COVID-19 has been fallen on almost all sectors of development. Many precautionary measures have been taken to reduce the spread of this disease where wearing a mask is one of them. In this paper, I propose a system that restrict the spread of COVID by finding out people who are not wearing any mask in the public places which are monitored with cameras. While a person without a mask is detected, a warning sign is created and not allowed to enter into the building. A transfer learning architecture is trained on a dataset that consists of images of people with and without masks collected from various sources. It is hoped that the study would be a useful tool to reduce the spread of this communicable disease for many countries in the world.**

***Keywords*- Corona; COVID19; Arduino; Mask; Tensor flowJs; Corona Virus; Mask Detection.**

I. INTRODUCTION

The outbreak of coronavirus (COVID-19) has forced many countries & states to initiate new rules for face mask-wearing. Government of Odisha have started working on new strategies to manage spaces, social distancing, and supplies for medical staff and normal people.

Also, the Govt. of Odisha has forced organizations like hospitals, colleges, schools and other public places to take prevention measures to stop the spreading of coronavirus. Further a new strain which has not previously been identified in humans is novel coronavirus which ranges from colds to deadly infections like Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS).

People all over the state (Odisha) are facing challenging situations due to this pandemic. Every day a large number of people are being infected and died. For this reason, the people are forced by law to wear a face mask in public places, maintain social distance and not to come out of the home if the body's temperature rises above 101 degree Fahrenheit. But very sadly, people are not obeying these rules properly which is speeding the spread of this virus.

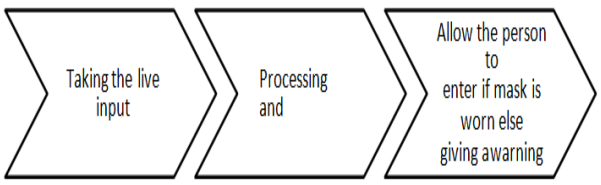

Fig 1. Work Flow.

Detecting the people not obeying the rules and informing the corresponding authorities can be a solution in reducing the spread of coronavirus.The main objective of this paper is to find out whether a person is wearing a mask or not at various entrances (like colleges, hospitals, airports) and open the entrance if the person would have worn a mask. [Fig 1]

II. METHODS

The face mask recognition in this paper is developed with a machine learning algorithm through the image classification method using Google's Teachable Machines; which is a GUI based online machine learning model trainer.

Fig 2. Dataset of Mask and No Mask.

The teachable machine first takes nearly 200 images of persons with wearing variety of mask and 150 images of persons without masks. All the images are curated from

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Google Images. [Fig 2]. Also the images from the camera has been taken with the previous data for lightening conditions [Fig 3] with total 224 image samples for "Mask" and 170 image samples for "Without Mask".

Fig 3. Personal Dataset of Mask and No Mask.

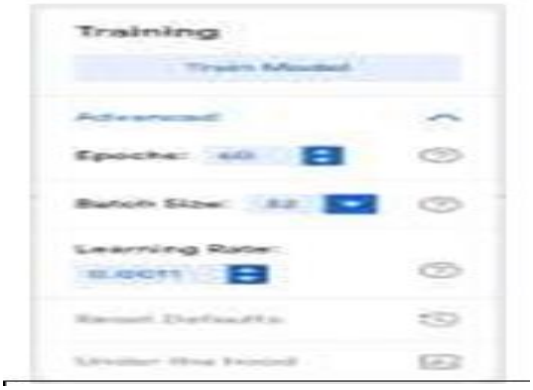

Fig 4. Training Dataset Features.

The data is trained with an Epochs of 60, Batch size of 32 and with a learning rate of 0.0011. [Fig 4]. The Teachable Machine uses a popular deep learning technique called transfer learning. It may take 2-3 minutes to 30 minutes depending upon the epochs, batch size and learning rate.

III. DISCUSSION

After the training, we got the accuracy per class is in ratio 34:26 (check the confusion matrix) with a test accuracy of 0.94999 [Fig 5]. The training data is exported in Tensorflow.js format. Using the exported result, we can use the link generated to add it to any website portal to run the model.

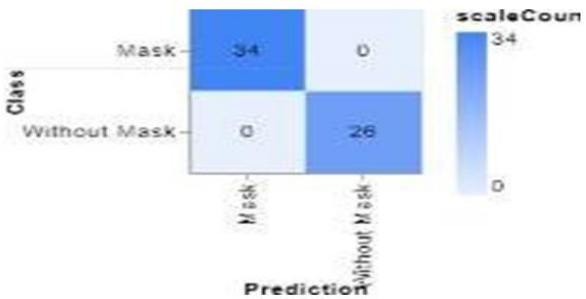

Fig 5. Confusion Matrix.

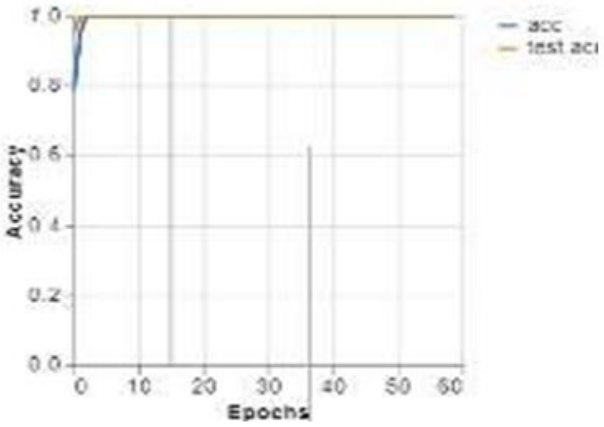

Fig 6. Test Accuracy Graph.

In this project, a sample webpage is created to test the trained data. The model implemented in the video. If a face is detected, it proceeds to the next process. From detected frames containing faces, reprocessing will be carried out including resizing the image size, converting to the array, pre-processing input using Tensorflow.js.

Now, the algorithm sends signal to the Arduino through serial port (via P5.js webpage using Chrome WebUSB). If the person is wearing masks, the JavaScript script will send a signal to Arduino via P5.js to open the gate else it will give a warning to wear a mask [Fig 7].

IV. ADVANTAGES AND LIMITATIONS

1. Advantages:

- Easy to train and deploy at various places since it is fully based on a web-browser support.
- The system can easily detect the mask one by one.
- Less expensive and easy to install in every gate since it only uses Arduino/any microcontroller.

2. Limitations:

- The system fails when the crowd is large and the entry sequence is not in queue.
- It is not fully automated hence we need a person to monitor.
- Algorithm needs more optimization for low/dark backgrounds and lightning conditions.

V. CONCLUSION AND FUTURE SCOPE

In this work, a system for face mask detection has been introduced, and allowing the masked persons object to prevent COVID-19 spreads from human to human in various public places. For image detection, we have employed the model trained using Teachable Machines to produce high-performance outcomes using Tensorflow.js. Using P5.js, the algorithm sends signal to open the gate when the person is wearing mask.

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The system is quite slow since it is trained from a automatic trainer. In future, this model will be trained manually using OpenCV, Tensorflow & Deep Learning and will be deployed in a edged based device to optimize the algorithm. Further, there will be an implementation of temperature sensor to detect the temperature to make the screening more accurate.Thus, in overall the system aims to stop the spread of the virus making the persons to wear mask and avoid crowd.

REFERENCES

[1] WHO | About COVID-19 | COVID-19 | Health topics, [online] Available: http://www.emro.who.int/health-topics/corona-virus/about-covid-19.html.
[2] Deploy Teachable Machine: Arduino, [online] Available: https://medium.com/analytics-vidhya/deploy-teachable-machine-circuit-playground-express-arduino-p5-js-tinyusb-b30508d4024a,
[3] Google's Teachable Machine | Website, [online] Available: https://teachablemachine.withgoogle.com/
[4] Deployment of Paper | Netlify, [online] Available: https://test-cogate.netlify.app.

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