IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.11404

Object and Sign Detection System

Sweta Eppanapelli[1], Darshan Patil[2], Manoj Gharge[3], Prof.V.E.Pawar[4]

Student, Information Technology, Bharati Vidyapeeth College of Engineering, Navi Mumbai, India[1,2,3]

Assistant Professor, Information Technology, Bharati Vidyapeeth College of Engineering, Navi Mumbai, India[4]

Abstract: Communication can be defined as a act of exchanging information, Emotions, Feelings among each other or group of people. But in case of Dumb & Deaf people it becomes difficult to communicate. In this paper, a real time System for Sign Language detection was built through the images captured by PC camera. The main aim of this project is to help Disabled people, Dumb & Deaf, Paralyzed people to communicate with ease. This model detects the sign irrespective of the standard Sign Language. The existing Digital Models are slow, they take very plenty amount of time just to print a Alphabet, and thinking of whole sentence is a lot of time. This model overcomes the problem of time as it detects it as whole word other than a single alphabet. This model is proposed using TensorFlow Algorithm was made using a set of images for particular sign in different skin tones, lightning, and background, etc. The system displays high accuracy of 80-90% for the sign detection.

Keywords: Sign Language, Gestures, Real Time, Labeling Software, TensorFlow Object detection module.

I. INTRODUCTION

A very few people know how to communicate using a sign language as it is not a mandatory language to learn. Communication carries three elements: the Speaker(one who talks), the Message which is been communicated, and the receiver(one who listens). It is considered to be successful only when the message which sender has sent or said is completely understood by the receiver or the listener. The most common means to communicate with them is with the help of human interprets and which becomes very expensive and not everyone can afford it. There are many different sign languages all over the world. There are more than 200 sign Languages, this System aims in communicating with differently abled people, dumb & deaf without the help of human interpreter. This model translates the signs/gestures captured into text so that the user can simply read and know what the person is trying to convey irrespective of whether the user has knowledge about the sign language or not.

II. OBJECTIVE

The Objective of the paper are as follows:

1. It aims in communication without the help human interprets or translators.
2. This system uses different images for a particular sign in different skin tones, lightning, background, etc.
3. This system displays image with accuracy of 80-90%.

III. RELATED WORK

1. G.A. Rao et al [1] has developed a sign language recognition approach based on CNN for a data set consisting of 200 different sign languages viewed from 5 different angles with different background environments and achieved 92.88% recognition accuracy.
2. A classification problem of three types of hand gestures, labeled as open, closed and unknown, was performed with different architectures of CNN by varying the hyper parameters [2]. On comparison, the best model which uses a matching layer was found to give a classification accuracy of around 73.7%.
3. [3], Sharmila Gaikwad, Akanksha Shetty, Akshaya Satam, Mihir Rathod and Pooja Shah used SIFT approach, for generation of the image feature, takes a picture and transform it. The gesture will be translated into its recognized character or alphabet from the gesture which is beneficial to be understood.

IV. PROPOSED WORK

In this project, the system is designed using TensorFlow Object Detection Algorithm using real coloring images. This system is divided into phases Initially we wrote some code to automate the picture taking process, once the pictures were taken, we used the software to segregate these images into appropriate labels/categories. These Categories are made in such a way that they express the meaning of gesture made. Once the labeling of image is done. we have two sets of files

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.11404

where, one which has the actual image in it and the other being an XML file which contains information of where the model should be looking in the image during the training process. Once files are generated the process begins where its uses the Learning Algorithm to extract the required features from the image. After the model has been trained it allows the sign language part to begin its detection. To achieve the detection. we have used TensorFlow Detection API, which takes the extracted features and sends to the TensorFlow module which further does the comparison part in the frame. On detection of any of the feature it creates a boundary box around the detected gesture and makes the prediction. The prediction is going to be same as label of the image, hence it becomes very important to understand the gesture which is made as label name, a wrongly named label could result in a wrong prediction.

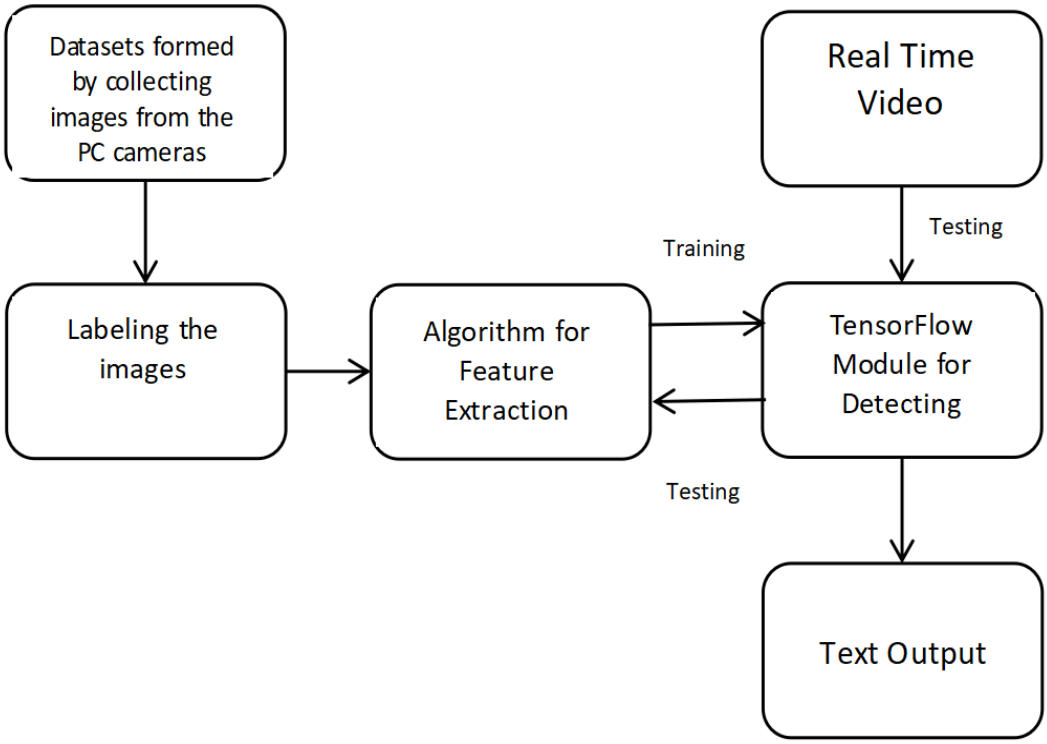

Fig.1.System Architecture

The Labeling Software is used for graphically labeling images which are further used for detection. Once image are labeled and saved, an XML file is created for that specific image. This XML helps in where the model should be looking in the image during training process. The labeling is done by drawing a box around the gesture made. This box is called the Ground Truth which means a set of measurements that is known to be much more accurate than measurements from the system you are testing. Out of all the images collected along with the generated XML file for each image, few were used for testing and remaining images are used for training the model. This model was trained and tested using TensorFlow Object Detection API. TensorFlow is an open-source library for numerical computation and large-scale machine learning that eases Google Brain TensorFlow, the process of acquiring data, training models, serving predictions, and refining future results. The TensorFlow Object Detection API is an open-source framework built on top of TensorFlow that makes it easy to construct, train and deploy object detection models. There are already trained models in their framework which are referred to as Model Zoo. It includes a collection of trained models on various datasets such as the COCO (Common Objects in Context) data set, the KITTI data set, and the Open Images Data set. The TensorFlow object detection API is the framework for creating a deep learning network that solves object detection problems.

We use ‘Checkpoints’ that are save points which a model generates to keep track of how much it has trained itself. In case the training process is interrupted, it would simply start itself again from the checkpoint. Since the training process can be very time consuming, this mechanism allows the model to save itself from system failures. The learning rate of our model when used 1800 steps for training is shown below.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.11404

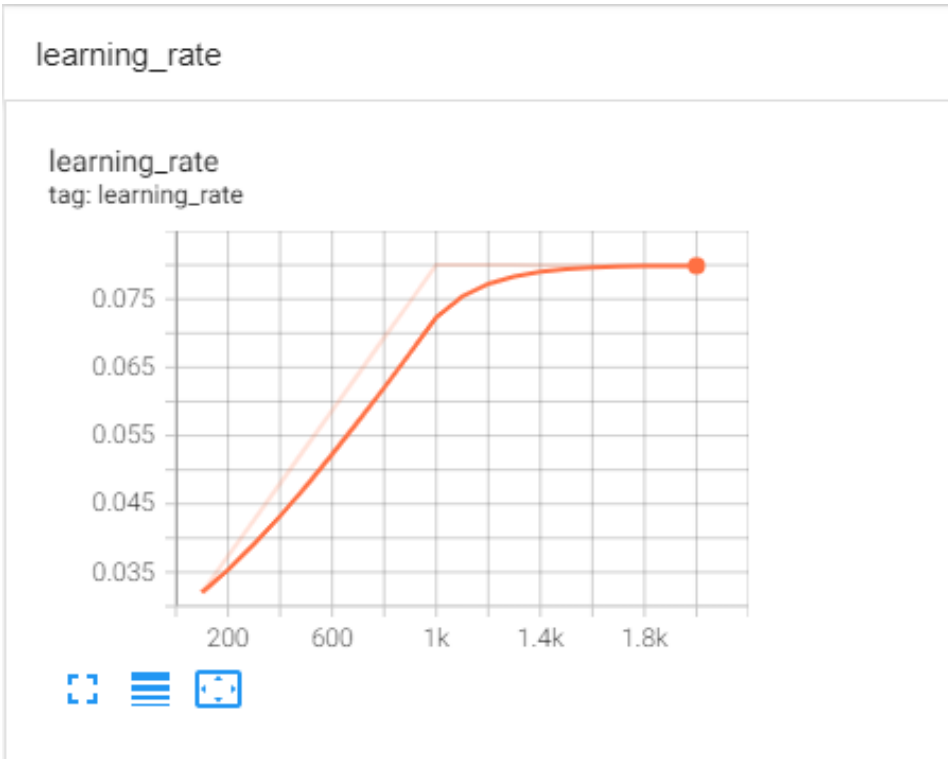

Fig.2. Learning rate of model

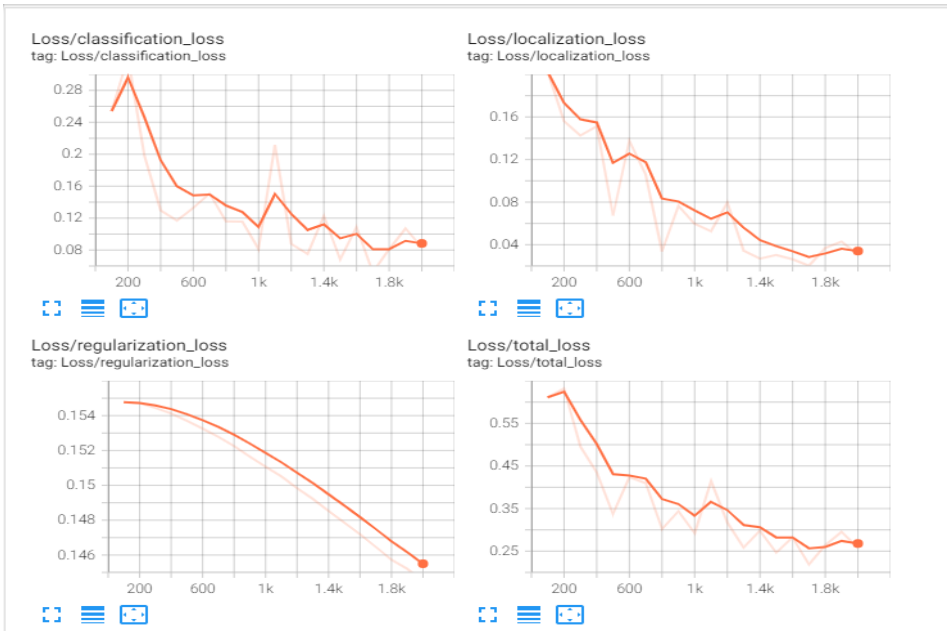

Fig.3. Loss of Machine Learning Model

V. RESULT

A sign language detection using TensorFlow sign language detection Algorithm with colorful images taken from PC camera was introduced in this paper. In this paper sign language are transferred into statement for better understanding of differently abled people, Dumb & Deaf, paralyzed people. This system has showed very good results with the accuracy of 80-90%. The below figure shows how sign language is detected.

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Impact Factor 7.39 ⁜ Vol. 11, Issue 4, April 2022

DOI: 10.17148/IJARCCE.2022.11404

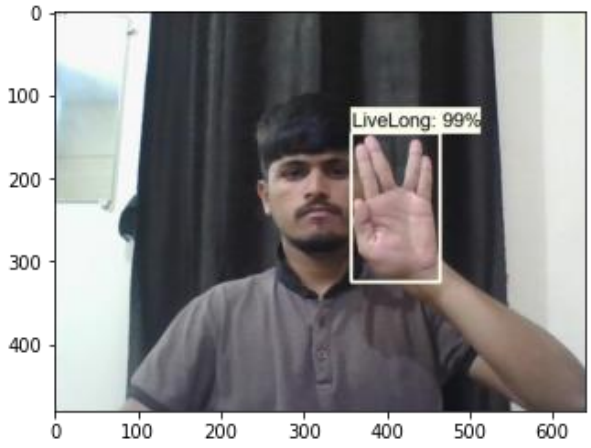

Fig.4. Livelong Sign Detection

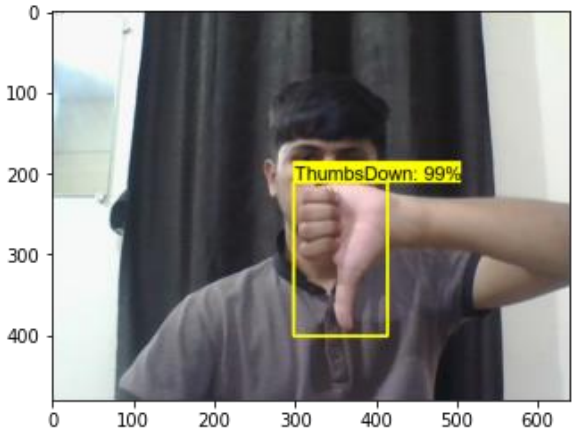

Fig.5. ThumbsDown Sign Detection

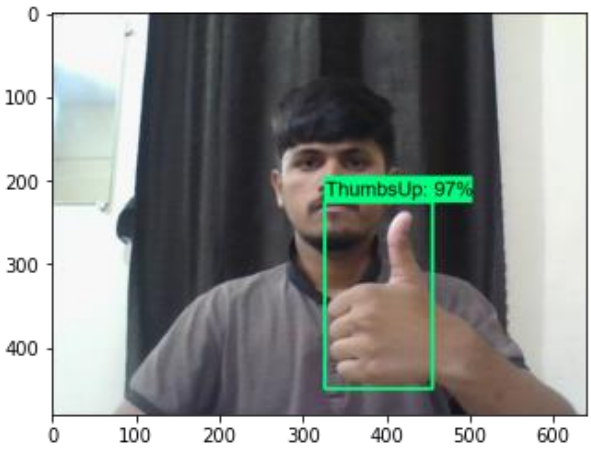

Fig.6. ThumbsUp Sign Detection

In Fig.4. a Livelong sign detection is shown with the accuracy of 99%, a boundary type of box is created around the sign to highlight the sign language which will help in better understanding. In Fig.5. a Thumbs Down sign detection is shown with image accuracy of 99% with a yellow graphical border to highlight it. In Fig.6. Thumbs Up sign detection is shown with image accuracy of 97% along with a green green graphical border to highlight. All the results in this system will give maximum accuracy.

VI. Conclusion

In this paper a Sign Language Detection is shown using TensorFlow Detection Algorithm with colorful images taken from PC Camera. Wide varieties of data sets of features, for example different angles, skin tone, different background, lightning, and wide range of hand gestures. The system has achieved maximum accuracy range up to 95% and above. In addition system has also show high accuracy to the data which was not in the training. There is more scope for this project, we can add label to the images, add names to the gestures without having any language boundary so the user can easily access with their familiar language.

References

[1].G. A. Rao, K. Syamala, P. V. V. Kishore and A. S. C. S. Sastry, "Deep convolutional neural networks for sign language recognition," 2018 Conference on Signal Processing And Communication Engineering Systems (SPACES), Vijayawada, 2018, pp. 194-197.

[2].I. Rocco, R. Arandjelovic and J. Sivic, "Convolutional Neural Network Architecture for Geometric Matching,"2017 IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Honolulu, HI, 2017, pp. 39-48.

DOI: 10.17148/IJARCCE.2022.11404

[3]. Sharmila Gaikwad, Akanksha Shetty, Akshaya Satam, Mihir Rathod, Pooja Shah5 – "Recognition of American sign language using Image Processing and Machine Learning" - International Journal of Computer Science and Mobile Computing, March- 2019.

[4]. Sheik Monirul Hassan, Md. Saiful Islam, Md. Assahduzamman, Mohammad Aminur Rahman - "Automated Software Testing Cases Generation Framework to Ensure the Efficiency of the Gesture Recognition Systems" - International Conference On Computer and Information Techology, December-2019.

[5]. Shagun Gupta, Riya Thakur, Vinay Maheshwari, Namita Pulgam - "Sign Language Converter using Hand Gesture" - International Conference on Intelligent Sustainable System- 2020.

