IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

GESTICULATION LINGUIST

[1]Minnuja Shelly, [2]Krishnapriya Sadhasivan, [3]Risala K M, [4]Shasna P A, [5]Sunhath K A

[1]Assistant Professor, Department of Computer Science and Engineering, [2]Student, Department of Computer Science and Engineering, [3]Student, Department of Computer Science and Engineering, [4]Student, Department of Computer Science and Engineering, [5]Student, Department of Computer Science and Engineering

Universal Engineering College, Thrissur, Kerala

Abstract: **Communication is an important aspect of every single individual. We are able to express our ideas and thoughts through communication. But this is not the case with differently abled person i.e., person who can't speak or/and hear. For such differently abled people, a mechanism has to be developed to tackle this communication gap. In this project, different mechanism and procedures to develop a sign language translator are discussed.**

Index Terms **- sign language , feature extraction , translator**

I. INTRODUCTION

Main aim of this survey is to bridge the communication gap between the disabled and the normal people. Common man does not understand the sign language depicted by the differently abled persons. As a result the need of an translator has become essential in this competitive world. The need of an third person can be easily replaced by any of these mechanisms through various devices, including hand held devices such as smart phones. These translator devices can be carried along with disabled person to any part of the world and is also easily accessible with the help of internet support. Through the development in technologies even more user friendly and budget friendly translators are gaining higher amount of interest.

II. THEORY

A. Sign language

Sign languages are languages that use the visual modality to convey meaning. Sign languages are expressed through articulations in combination with non-manual elements. Sign languages are full-fledged natural languages with their own grammar and lexicon. Sign languages are not universal and are usually not mutually intelligible with each other, although there are similarities among different sign languages.

B. Feature Extraction

Feature extraction is a part of the dimensionality reduction process, in which, an initial set of raw data id divided and reduced to more manageable groups. So when you want to process it will be easier. The most important characteristics of these large data sets is that they have a large number of variables. These variables require a lot of computing resources to process them. So feature extraction helps to get the best feature from those big data sets by select and combine variables into features, thus, effectively reducing the amount of data. These features are easy to process, but still able to describe the actual data set with the accuracy and originality.

C. Translator

A translator is a person whose job is translating writing or speech from one language to another. Here ,in this context translator refers to anyone who translates sign languages to more understandable languages such as a specific native languages. Human translators can be easily replaced with device based translators using the improving technologies.

III. RELATED WORK

Here we introduce each papers based on the technologies used in the Sign Language Translator. This paper[1] proposes, a System to make communication through the internet easier for thedeaf and mute community. Thus, the sensor-based approach might not be very feasible due toits complexity and difficulty to use it. The authors of this paper[2] ,presents a mobile VISION-BASED SIGN LANGUAGE TRANSLATION DEVICE for automatic translation of Indiansign language into speech in English to assist the hearing and/or speech impaired people tocommunicate with hearing people. It can act as a translator between a common man ,who doesnot understand sign language and a disabled person. The paper[3]points to the difficulties facedby speaking impaired persons. It is hard for such individuals to express what they want to saysince sign language is not understandable by everyone. The paper is to develop a DataAcquisition and Control (DAC) system that translates the sign language into text that can beread by anyone. The paper[4]proposes an android application that converts sign language tonatural language and enable deaf and dumb community to talk over mobile phones. DevelopingSign Recognition methods for mobile applications has challenges like need for light weight

method with less CPU and memory utilization. The paper[5], present a gesture recognition glovebased on charge-transfer touch sensors for the translation of the American Sign Language. Thedevice is portable and can be implemented with low-cost hardware. The prototype recognizegestures for the numbers 0 to 9 and the 26 English alphabets, A to Z. The paper[6] proposes asystem that can automatically detect static hand signs of alphabets in American Sign Language(ASL). To do this, two combined concepts namely AdaBoost and Haar-like classifiers are beingused. The paper[7] aims to demonstrate a user-friendly approach towards Bangla Sign languageto text conversion through customized Region of Interest (ROI) segmentation andConvolutional Neural Network (CNN). 5 sign gestures are trained using custom image datasetand implemented in Raspberry Pi for portability. In this paper[8],A real-time portable signlanguage translation system for deaf-mutes will be presented. In the proposed system, a wirelesshand gesture recognition glove for real-time translation of sign language commonly used inTaiwan is developed. The paper [9] is focused on providing an applicative architecture of handglove that records the gestures made by a speech and hearing disabled people, converts theminto a meaningful text and transmits them to remote areas with help of Bluetooth, GSM-CDMAand Internet modules. The work[10] present SUGO, a depth video-based system for translatingsign language to text using a smartphone's front camera. While exploiting depth-only videosoffer benefits such as being less privacy-invasive compared to using RGB videos, it introducesnew challenges which include dealing with low video resolutions and the sensors' sensitivenesstowards user motion. The proposed[11] research based mobile-application development is to aidthe needs of the differently-abled (deaf and dumb) community. The application inherits the coredesign of artificial intelligence that eliminates the language barrier faced by the differently –abled people. [12] Deaf and speech impaired have limitations in terms of communication.Researchers are keen to develop a technology translator is able to translate sign language intowritten language. Growing technology is still limited to the PC-based translator. Researchers are interested in developing the mobile translator shaped because of its simplicity that can be brought in mobile. [13]Nowadays, web technologies are a very efficient way to ensure communication between a large and heterogeneous audience. Furthermore, web information ismainly based on textual and multimedia content and consequently, some people with special needs, such as deaf and hard of hearing people, have difficulties to access to information or to communicate with hearing people. The paper [14]helps the deaf and dumb person to communicate with the rest of the world using sign language. Communication plays an importantrole for human beings. Speech-to-sign technology and VRS enables audible language translation on smart phones with signing and application has characters feature in mobile without dialing number uses a technology that translates spoken and written words into sign language with video. In this paper[15], an accurate implementation of American Sign LanguageTranslator is presented. It is a portable electronic hand glove to be used by any deaf/mute personto communicate effectively with the others who don't understand sign language. It provides thevisual and audible output on an LCD and through a speaker respectively. The main aim of the research[16]is to build a mobile application using augmented reality (AR) translation system which will also provide the human gesture understanding and motion capture by snapping the real world using a smartphone's camera that requires the user to simply tap on the word of interest once in order to produce a translation, presented as an AR overlay. The paper[17] like topresent a Convolutional Neural Network (CNN) model for predicting American Sign Language. There are 4800 images were captured to train and validate the proposed model. 95%recognition accuracy was attained in experiment, which shows robust performance in recognition 24 static American Sign Language pattern. The research[18] proposes a semantic translation system for dynamic hand gestures using deep learning and ontology. We used the proposed MSLO (Multi Sign Language Ontology) in the semantic translation step. The work[19]addresses the issue of" sign language recognition and sign language translation". The dataset used here is American Sign Language(ASL) Alphabets, which contain 26 letters and 3 specialcharacters that are space, delete and nothing. The paper[20] considers peculiarities of the Russiansign language grammatical system which should be taken into account when developing a computer sign language translator. We draw a conclusion that the Russian sign language has itsown grammatical system which includes word formation, morphology, and syntax, and may be described in terms and categories of the Russian language.

IV. DATA SET

It is labelled by taking into account the number of frames. A dataset must be created to do each class labelling. The upper body, face, and two hands are all considered. A coordinate is assigned to each skeletal joint. The upper body's joints and landmarks are used as co- ordinates. In a single frame around 1000 coordinates are there. For creating data, each class label will take video sequences along with 30 frames.1000 coordinates will be extracted from each frame. A dataset is constructed and saved for each class label in this manner. And these datasets will be utilized for learning. About 5% of the data is used for testing, while the rest is used for training.

Fig 1: hand key points

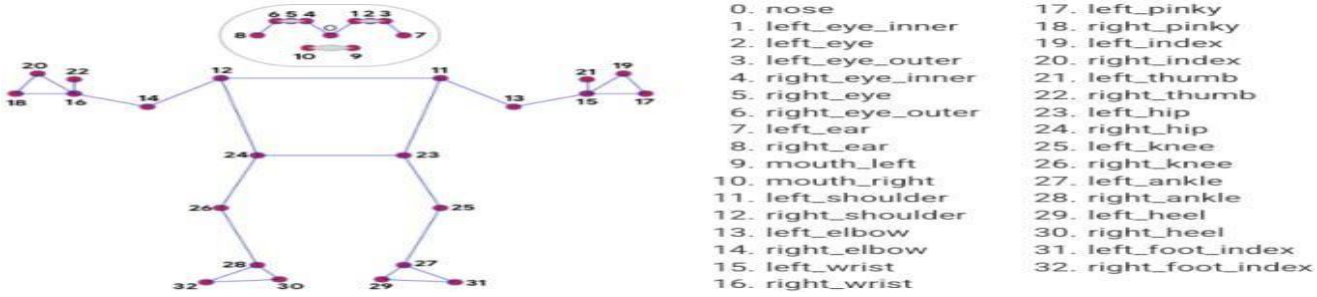

Fig 2: Body Pose Landmarks

V. METHODOLOGY

The main objective of this project is to recognize the gesture enacted by the disabled person and represent it in text and audio format. The process begins by capturing the actions using webcam and converting the sequence of actions into frame by frame. A video sequence of 30 frames whenformed will be given as input to the model trained with the training data set. And the model then analyses the video sequence and predicts the output with a probability value indicating the extentup to which the predicted output is correct. The model after being trained with the data set and is found to be valid and correct will be saved in order to use it in the application to predict the output.In order to brief up the working, the entire project is being divided into 4 modules. The first moduleis the main module, where the training of the model which predicts the output occurs. The model chosen here is the LSTM model. Long short-term memory (LSTM) is an artificial recurrent neuralnetwork (RNN) architecture used in the field of deep learning (DL). Unlike standard feed forwardneural networks, LSTM has feedback connections. It can process not only single data points (suchas images), but also entire sequences of data (such as speech or video). LSTM networks are well-suited to classifying, processing and making predictions based on time series data. Tensor flow (keras) is the method used for this LSTM deep learning model creation. Tensor Flow is a free andopen-source software library for machine learning and artificial intelligence. It can be used acrossa range of tasks but has a particular focus on training and inference of deep neural networks. Nowthe next module is the land mark detection and drawing module. In order to obtain the co-ordinatesof the input captured through web cam using open cv, we use media pipe. Media pipe is used for landmark detection, where the co-ordinates that is required and is necessary to predict the gesture is identified. The skeletal co-ordinate point detection of the hand, face and the upper part of the body is done here. It also includes the drawing module that represents the detected landmark on the frame just to ensure that the system is working. This module can be skipped if not required. The third module is the key point extraction module, the purpose of this module is to pre-processthe co-ordinates extracted by the previous module. The main idea here is to specify which co- ordinate represents what portion of the upper body that is captured, such as the points on the face,right hand, left hand, different joints in the body etc for more precision. Now the final module is the probability visualization and audio module. Once the LSTM model is trained with the trainingdata set and after the input that is captured is being split up into video sequences, where each sequence has 30 frames and after their co-ordinate extraction and pre-processing the input is nowready to be fed into the model for prediction. This output prediction occurs in the last module. Thepre-processed input when fed into the model carefully checks the each and every 30 frame sequence and from the training it received, it predicts the output gesture with a probability value that specifies the extent up to which the model is confident that the predicted gesture is correct. Ifthe probability value is 80% or above then the prediction is considered correct and the output as text is displayed. In order to convert the text into audio format the library pyttsx3 is being used. Itcan convert the text into audio. If we need to stop or exit from the application then simply click Qbutton on the keyboard and the application gets terminated.

VI. RESULT

The system, when provided with the proper gestures, gives out the corresponding words audio output. The system can provide proper results even when there are some slight variations in gestures. There will be different kinds of variations from different kinds of persons performing thegestures. The system recognizes multiple gestures one after the after and the gives out the respective words. In this project if we use a single thread to produce both the text and audio outputthen there are chances that the system would crash or stop working. Therefore to avoid such inconvenience we use a separate thread for text output and separate thread for audio output.

VII. CONCLUSION

The requirement of machine-based sign language translator is very important in the present scenario. 95% of the data set is used for training the model and 5% is used for testing the efficiencyof the project. With improvement in technologies this project can be applied to wider populationsin order to tackle the problem of communication gap between common man and disabled person.

VIII. REFERNCES

[1]. Mr. R. Augustian Isaac, S. Sri Gayathri," Sign Language Interpreter", International ResearchJournal of Engineering and Technology (IRJET) Volume: 05 Issue: 10 | Oct 2018.

[2]. Madhuri.Y,Anitha.G, AnbAnburaja," Vision-based sign language translation device".IEEE 2013 International Conference on Information Communication and Embedded Systems (ICICES2013), February 2013.

[3]. Mohammed Elmahgiubi, Mohamed Ennajar, Nabil Drawil, Mohamed Samir Elbuni." Sign language translator and gesture recognition". 2015 Global Summit on Computer & Information Technology (GSCIT)11-13 June 2015.

[4]. Mahesh, M; Jayaprakash, Arvind; Geetha, M,"Sign language translator for mobile platforms",IEEE 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI), September 2017.

[5]. Abhishek, Kalpattu S,Qubeley, Lee Chun Fai,Ho, Derek," - Glove-based hand gesturerecognition sign language translator using capacitive touch sensor", IEEE International Conference on Electron Devices and Solid-State Circuits (EDSSC), August 2016.

[6]. Truong, Vi N. T.; Yang, Chuan-Kai; Tran, Quoc-Viet," Global Conference on Consumer Electronics - A translator for American sign language to text and speec" , IEEE 5th Global Conference on Consumer Electronics , October 2016.

[7]. Khan, Saleh Ahmad; Joy, Amit Debnath; Asaduzzaman, S. M.; Hossain, Morsalin ," An Efficient Sign Language Translator Device Using Convolutional Neural Network and CustomizedROI Segmentation",IEEE 2019 2nd International Conference on Communication Engineering andTechnology (ICCET),March 2019.

[8]. Kau, Lih-Jen; Zhuo, Bo-Xun," Live demo: A real-time portable sign language translation system", IEEE Biomedical Circuits and Systems Conference (BioCAS) , October 2019.

[9]. Bajpai, Dhananjai; Porov, Uddaish; Srivastav, Gaurav; Sachan, Nitin,"Two Way Wireless Data Communication and American Sign Language Translator Glove for Images Text and SpeechDisplay on Mobile Phone",Fifth International Conference on Communication Systems and Network Technologies (CSNT),March 2015.

[10].HyeonJung Park, Youngki Lee, JeongGil Ko , "Enabling Real-time Sign Language Translation on Mobile Platforms with On-board Depth Cameras", Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies , Volume 5, Issue 2 June 2021.

[11]. Poovam Raj T. T , UdhayaKumar S and Silviya Nancy J," Smart City Based Mobile Application for Seamless Communication of Differently Abled", International Journal of Multimedia and Ubiquitous Engineering Vol.12, No.1 (2017), pp.177-190.

[12]. Setiawardhana, ; Hakkun, Rizky Yuniar; Baharuddin, Achmad, "Sign language learning based on Android for deaf and speech impaired people" International Electronics Symposium (IES), September 2015.

[13]. Mehrez Boulares,Mohamed Jemni,"MOBILE SIGN LANGUAGE TRANSLATION SYSTEM FOR DEAF COMMUNIT",Proceedings of the International Cross-Disciplinary Conference on Web Accessibility,April 2012 .

[14]. A. Gayathri, A. Sasi Kumar, "Sign Language Recognition for Deaf and Dumb People UsingAndroid Environment", INTERNATIONAL JOURNAL OF CURRENT ENGINEERING AND SCIENTIFIC RESEARCH (IJCESR), VOLUME-4, ISSUE-5, 2017

[15]. Arslan Arif, Syed Tahir Hussain Rizvi, Iqra Jawaid, Muhammad Adam Waleed, MuhammadRaheel Shakeel," Techno-talk: An American Sign Language (ASL) Translator" International Conference on Control, Decision and Information Technologies (CoDIT), April 2016.

[16]. Weichelt, Bryan; Yoder, Aaron; Bendixsen, Casper; Pilz, Matthew; Minor, Gerald; Keifer, Matthew (2018). "Augmented Reality Farm MAPPER Development: Lessons Learned froman App Designed to Improve Rural Emergency Response". Journal of Agromedicine.23 (3):284–296. doi:10.1080/1059924x.2018.1470051. ISSN 1059-924X. PMID 30047852.

[17]. Jin Yang, Member, IEEE, Xuefeng Bai, Dani Strickland, Lee Jenkins, and Andrew M. Cross,Member,"Dynamic Network Rating for Low

Carbon Distribution Network Operation—A U.K.Application".IEEE TRANSACTIONS ON SMART GRID, VOL. 6, NO. 2, MARCH 2015 .

[18]. Eman K. Elsayed,Doaa R. Fathy," Semantic Deep Learning to Translate Dynamic Sign Language", International journal of Intelligent Engineering and System,October 2020

[19]. Sruthi Chandrasekaran,, Christian Horn," American Sign Language Recognition and Translation using Deep Learning and Computer Vision", September 2021.

[20]. Grif, Mikhail G,Korolkova, Olga O, Demyanenko, Yelena A Tsoy, Evgeniy B, "Computer sign language translation system for hearing impaired users",IEEE 7th International Forum on Strategic Technology (IFOST), September 2012.