INDIAN SIGN LANGUAGE SYMBOL DETECTION AND RECOGNITION USING DEEP LEARNING TECHNIQUES

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ABSTRACT
An efficient sign language recognition system (SLRS) can recognize the gestures of sign language to ease the communication between the signer and non-signer community. In this project, a computer-vision based SLRS using a deep learning technique has been proposed. ISL uses both hands to make gestures instead of one hand unlike ASL. It leads to occlusion of features and this is a major barrier for the lack of development in this field. This project aims at helping in then research of this field further by providing a data set of ISL. A data of sign language was created by us for alphabets and numeric. This study has primary three contributions: first, a large dataset of Indian sign language (ISL) has been created using 65 different users in an uncontrolled environment. Second, the intra-class variance in dataset has been increased using augmentation to improve the generalization ability of the proposed work. Three additional copies for each training image are generated in this project, by using three different affine transformations. Third, a novel and robust model using Convolutional Neural Network (CNN) have been proposed for the feature extraction and classification of ISL gestures. The performance of this method is evaluated on a self-collected ISL dataset and publicly available dataset of ASL. This project goal is to take the simple step in connecting the social and communication bridge between regular people and the disabled people with the help of Indian Sign Language. As our project only deals with alphabets and numeric in ISL, it can be extended to common expressions and also words which can be more effective for disabled and normal people in communication and understanding. For this total of two datasets have been used and the achieved accuracy is 92.43 and 99.52%. The efficiency of this method has been also evaluated in terms of precision, recall, f-score, and time consumed by the system. The results indicate that the proposed method shows encouraging performance compared with existing work.

INTRODUCTION
Communication is a vital activity of human beings to live, as they can express their feeling, encourage cooperation and social bond, share their idea, and work together in society through communication only. People who are not able to hear or speak uses sign language as a mean of communication. Like spoken language, sign language also emerges and evolves naturally within hearing-impaired persons. It is a visual form of communication and in each country/region, where the hearing-impaired community exists, this sign language grows independently from the local spoken language of the region. Thus sign language from each region has distinctive syntax and structure, with one common property that it is perceived visually. ISL is mainly used in India, a country that has a large population of hearing-impaired people.

OBJECTIVE
a. The main objective of this system is to create Indian Sign Language using Deep Learning techniques.
b. The system performs image processing on inserted image and match with trained data set.
c. The system recognizes the sign using web cam also.

d. This aim of the system is communication i.e., the communication between signer and non-signer community.
e. For using this no need for high specs hardware and easy to use.

EXISTING SYSTEM

The system consists of live capture of hand gestures to process and identify the sign using ANN. Researchers has performed fundamental research on sign language datasets using the CNN algorithm to achieve satisfactory results from the training and testing of the dataset. In the authors proposed a system using CNN's Inception v3 on the dataset to test its accuracy as well and found it to be better than CNN. The format of Indian sign language is different and complicated as it uses both one-hand and two-hand gestures as compared with the prevailing language ASL. As a result, it becomes challenging task for existing models to show same results on ISLR due to feature occlusion. The research on ISL recognition system is still in primitive stage. There is no publicly available dataset of ISL. From the literature survey, it can be noted that authors had created their dataset of ISL for the performance evaluation of their work. These research articles on ISLR mainly had access to a small dataset with few signers and limited vocabulary. Most of the research articles are based on traditional machine learning approaches for ISLR. So the use of deep learning in the field of ISLR is proposed. The proposed system is using selfie language to process the images and is tested using stochastic pooling. The CNN model used to train the dataset in was performed using different window sizes and different batches of images and output accuracy achieved by them were 92.88% compared to the other methods they researched.

Disadvantages

1. Critical to recognition
2. Time taken process

PROPOSED SYSTEM

The proposed system is based on image processing and makes the process robust and automatic. An efficient sign language recognition system (SLRS) can recognize the gestures of sign language to ease the communication between the signer and non-signer community. In this project, a computer-vision based SLRS using a deep learning technique has been proposed. The performance of this method is evaluated on a self-collected ISL dataset and publicly available dataset of ASL. For this total of three datasets have been used and the achieved accuracy is 92.43, 88.01, and 99.52%. The efficiency of this method has been also evaluated in terms of precision, recall, f-score, and time consumed by the system. The results indicate that the proposed method shows encouraging performance compared with existing work.

MODULES

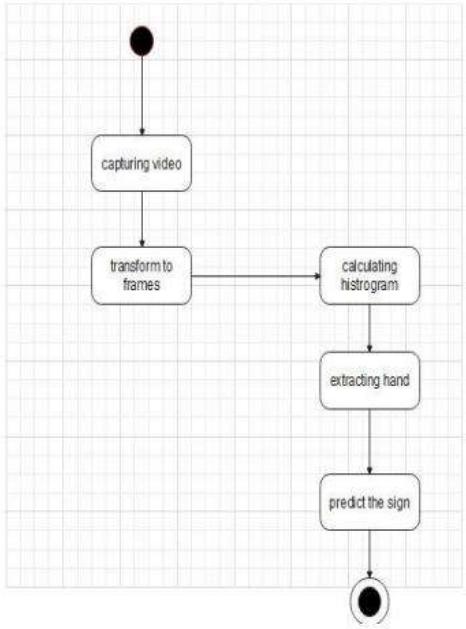
Upload Dataset

When you click on this button then it will direct you to file explorer and ask you to select name of folder . After selecting a folder, you will automatically return to the window and your selected folder will be visible in application window.

Open web

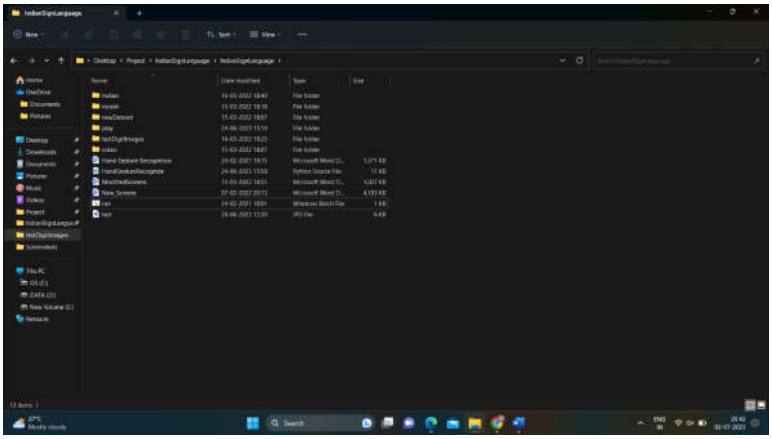
This button is used for specific symbol recognition using hands. After pressing this button symbols recognition will start and you will get output on the application window.

Upload Image: This button is used for uploading images of digits(0-9) and alphabets. After pressing this button currency images will are recognized and you will get output on the application window.

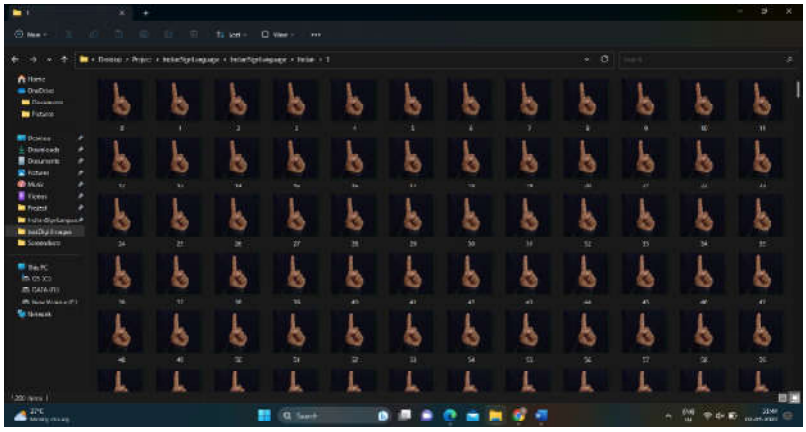


Results

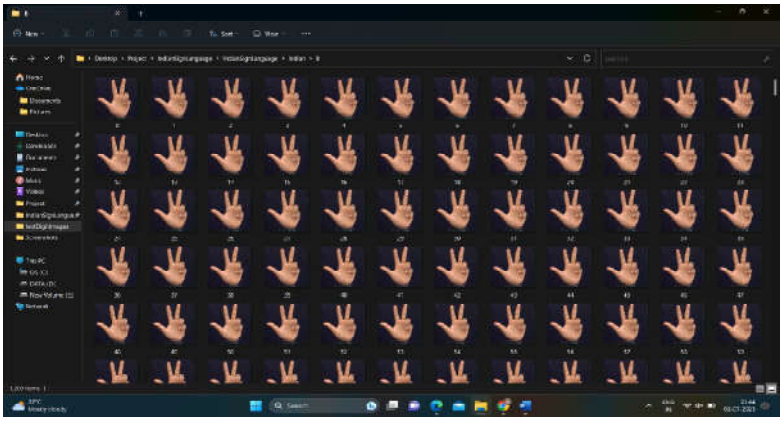
The project folder shown below where it contains the datasets and code



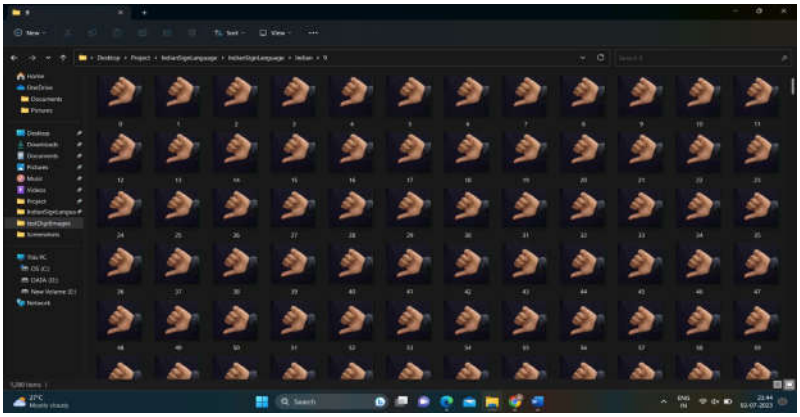
In below image the images it indicates number 1



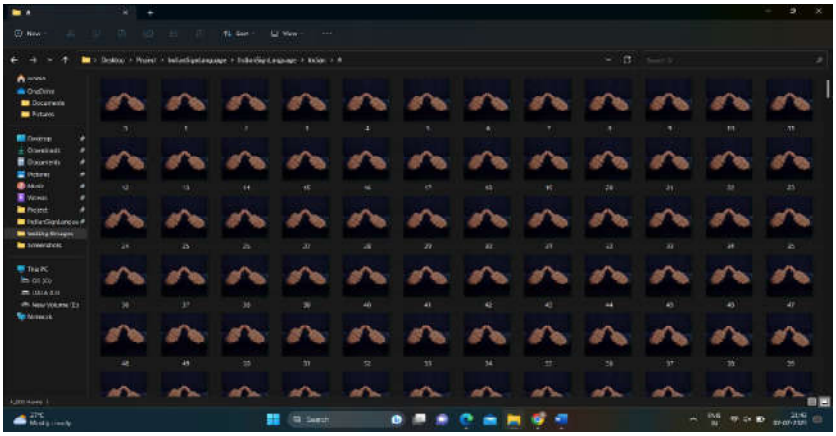
In the below images it indicates the number 8



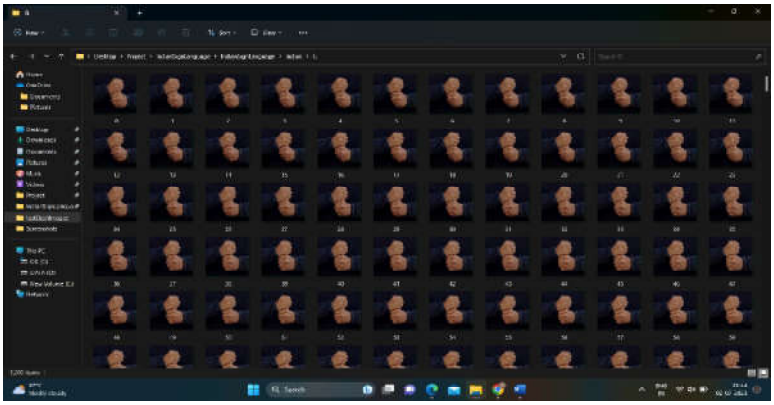
In the below images it indicates the number 9



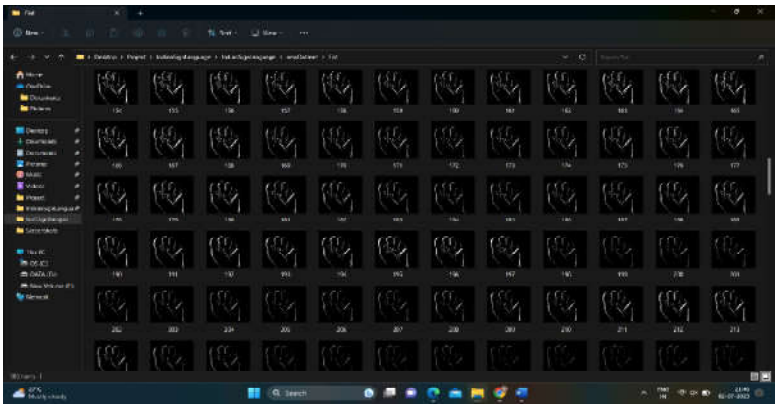
In the below images it indicates the alphabet A



In the below images it indicates the alphabet G

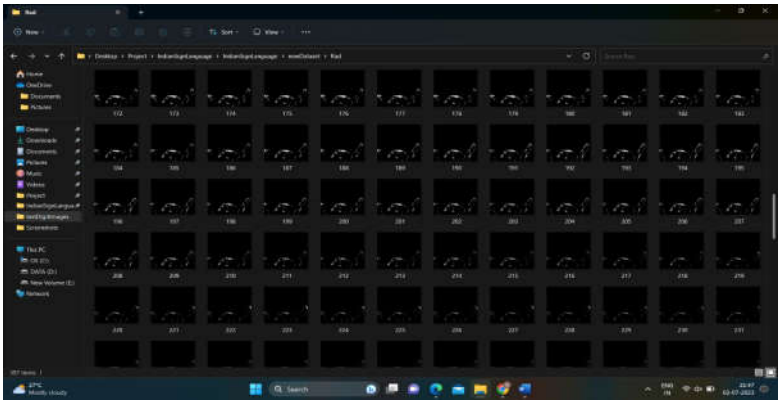


In the below images it indicates the symbol fist

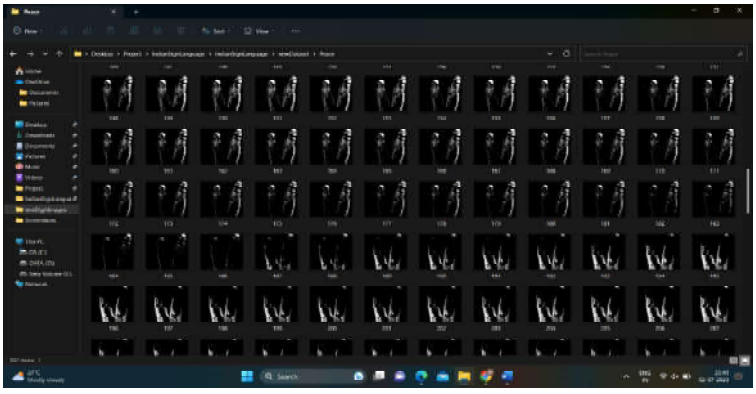


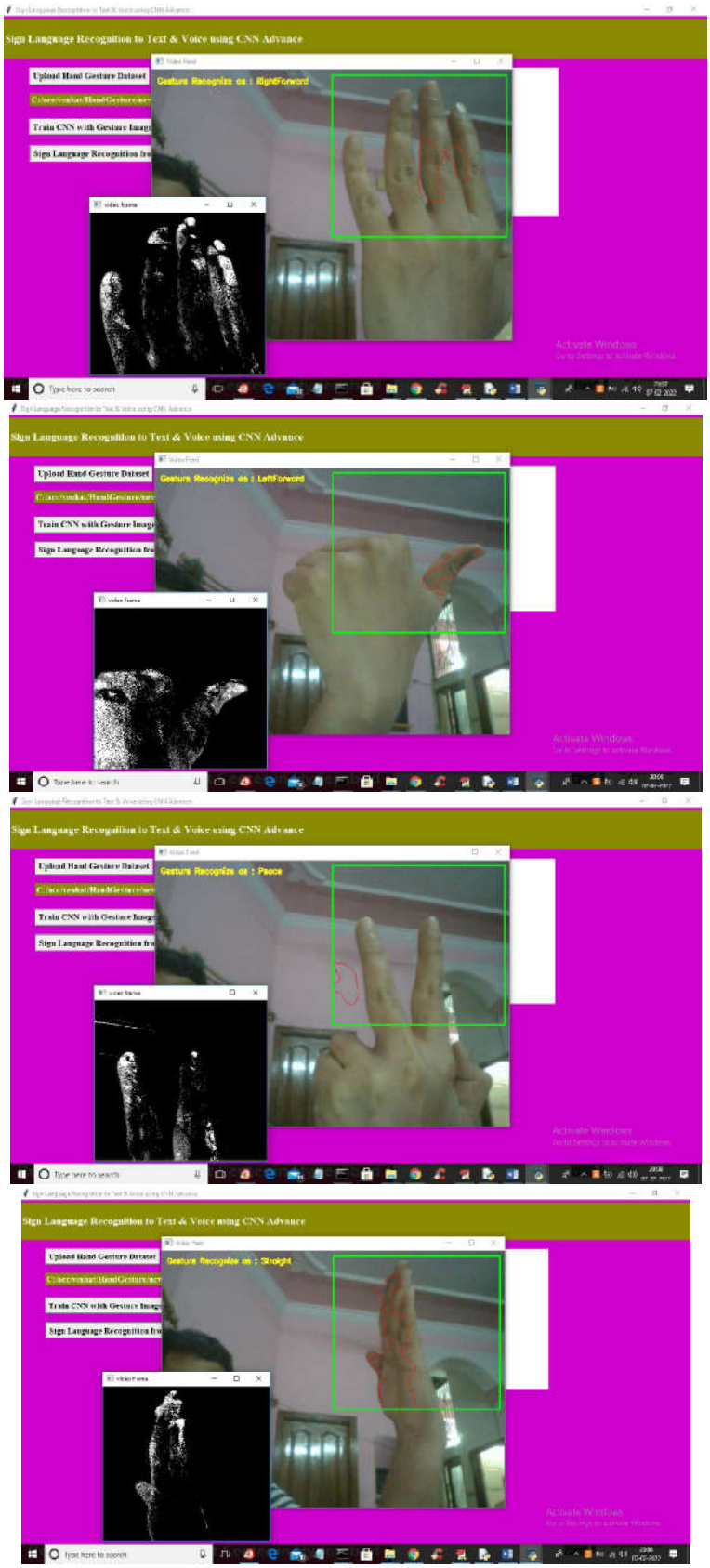
23

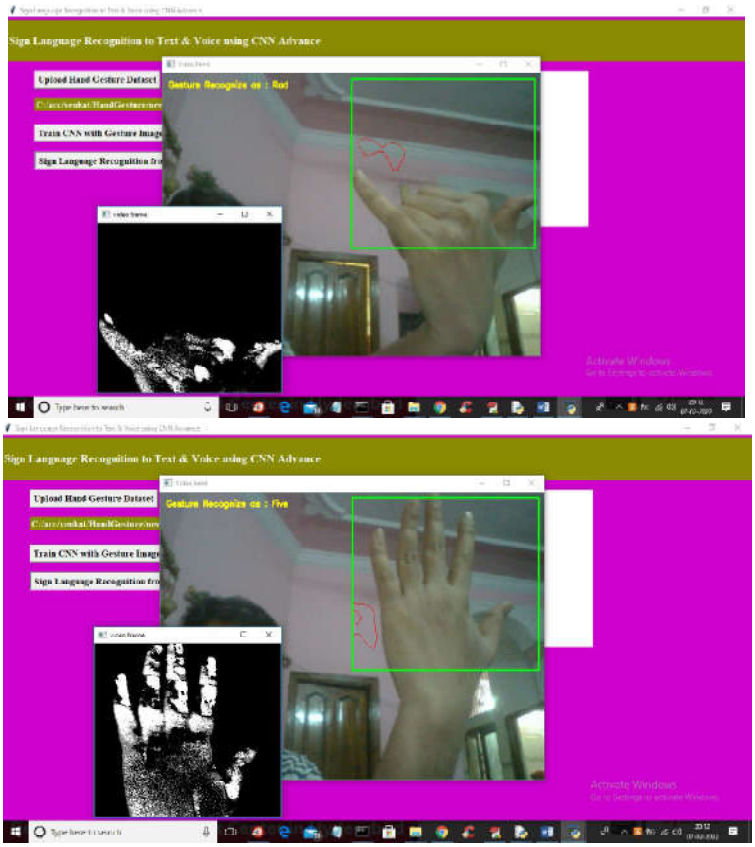
In the below images the symbol indicates rad



In the below images the symbol indicates peace




Sign Language Recognition to Text & Voice using CNN Advance
Upload Hand Gesture Dataset
Train CNN with Gesture Image
Gesture Recognize as : RightForward
Sign Language Recognition to Text & Voice using CNN Advance
Upload Hand Gesture Dataset
Train CNN with Gesture Image
Gesture Recognize as : LeftForward
Sign Language Recognition to Text & Voice using CNN Advance
Upload Hand Gesture Dataset
Train CNN with Gesture Image
Gesture Recognize as : Peace
Sign Language Recognition to Text & Voice using CNN Advance
Upload Hand Gesture Dataset
Train CNN with Gesture Image
Gesture Recognize as : Straight



CONCLUSION

A deep learning model based on Convolutional Neural Network using Depth wise Separable Convolution (CNN-DSC) is proposed for the vision-based recognition of Indian sign language. ISL is a key for communication for deaf and dumb people in India. This project goal is to take the simple step in connecting the social and communication bridge between regular people and the disabled people with the help of Indian Sign Language. This project gives a detailed implementation for Indian sign language recognition using Bag of words model. This model consists of a combination of convolutional layers interleaved with pooling operation and dropout layer, followed by fully connected layers. The efficiency of this system is evaluated on a self-collected ISL dataset and publicly available dataset of ASL. For this, a total of 3 datasets has been used and it achieves an average accuracy of 92.43, and 99.52% on the dataset I and II, respectively. It is evident from the findings that the proposed work achieves the best performance for the recognition of sign language. In this paper, data augmentation has been also used to improve the robustness and generalization of the model. From the experimental analysis, it can be seen that the CNN-DSC method also gives satisfactory results on an augmented data of large intra-class variation. On comparative analysis, this model shows competent results and is found as more robust to the confusion between the different letters and is invariant to the scale and size transformation. In the future, work can be done to enhance the accuracy of ISL recognition for the real-time scenario. For this, other deep learning classification models could be used to improve accuracy. Apart from this, work shall be done for the recognition of more static and dynamic gestures of ISL.

REFERENCES

1. Census of India 2011: Disabled population. Available: http://enabled.in/wp/census-of-india-2011-disabledpopulation. Accessed 30 Apr 2021.
2. Johnson, J. E., & Johnson, R. J. (2008). Assessment of regional language varieties in indian sign language. SIL International, Dallas, Texas, vol 2008, (pp. 1–121).

3. Kumar, D. A., Sastry, A. S. C. S., Kishore, P. V. V., & Kumar, E. K. (2018). 3D sign language recognition using spatio temporal graph kernels. Journal of King Saud University-Computer and Information Sciences.
4. Sharma, S., & Singh, S. (2020). Vision-based sign language recognition system: A Comprehensive Review. In: IEEE International Conference on Inventive Computation Technologies (ICICT), (pp. 140–144).
5. Sharma, S., & Singh, S. (2021). Vision-based hand gesture recognition using deep learning for the interpretation of sign language. Expert Systems with Applications, 182, 115657.
6. Cheok, M. J., Omar, Z., & Jaward, M. H. (2019). A review of hand gesture and sign language recognition techniques. International Journal of Machine Learning and Cybernetics, 10(1), 131–153.
7. Gan grade, J., & Bharti, J. (2020). Vision-based hand gesture recognition for indian sign language using convolution neural network. IETE Journal of Research, 1–10.
8. Sharma, S., & Singh, S. (2019). An analysis of reversible data hiding algorithms for encrypted domain. In: 2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), (pp. 644–648). IEEE.
9. 2021, ISL Dictionary Launch, Indian Sign Language Research and Training centre (ISLRTC). Available: http://www.islrtc.nic.in/isl-dictionary-launch. Accessed 30 Apr 2021.
10. Kakoty, N. M., & Sharma, M. D. (2018). Recognition of sign language alphabets and numbers based on hand kinematics using A data glove. Procedia Computer Science, 133, 55–62.