Paper - 01

Sign Language Interpreter System: An alternative system for machine learning.

Published Year: 2020

Abstract:

- ***Final Output:*** A glove-based system that translates American Sign Language (ASL) and Arabic Sign Language (ArSL) to text and speech, using a user-specific approach without a generic data set.
- ***Approach :*** Flex sensors, MPU6050, Arduino Mega, and Python GUI.
- ***Accuracy :*** 95% for static gestures and up to 88% for dynamic gestures.

Literature Review:

Extensive research has gone into the development of technology to achieve gesture to speech conversion which can be done using one of three approaches: vision based, sensor-based or hybrid-based which is a mixture between vision-based and glove-based systems but it is not widely used. These systems are adopted to capture hand configurations needed for the Sign Language Recognition (SLR).

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public*** : N/A

Conclusion:

An alternative system for ML which is capable of translating both ASL and ArSL alphabets and few words to text and speech, with the help of various sensors and a control unit mounted on a hand glove, displayed on a simple user interface using Python is presented.

Future Work: Using contact sensors, a left-hand glove, a bigger size glove, 4.4-inch flex sensors, and adding more sign languages and translation features.

Paper - 02

Interpretation of Swedish Sign Language Using Convolutional Neural Networks and Transfer Learning.

Published Year: 2021

Abstract:

- ***Final Output:*** The paper presents a Convolutional Neural Network (CNN) model that translates images from the SSL hand alphabet to text, using transfer learning to adapt a pre-trained model to a small dataset.
- ***Approach :*** Convolutional Neural Networks (CNNs), Transfer Learning.
- ***Accuracy :*** The final network has a testing accuracy of 85%.

Literature Review:

The studies presented in this section are based on ANN and transfer learning. The datasets used on the pre-trained models have all been limited.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public*** : N/A

Conclusion:

In this paper, we proposed an end-to-end machine learning model based on CNNs to translate images from the hand alphabet of SSL. We demonstrate that the problem of having a small dataset of SSL data is solvable using transfer-learning with a pre-trained model: our model is able to classify sign images with an accuracy of 85%

Future Work: Not Mentioned in that Paper.

Paper - 03

Real-Time Vernacular Sign Language Recognition Using MediaPipe and Machine Learning.

Published Year: 2021

Abstract:

- ***Final Output:*** With an average accuracy of 99%, the proposed model is efficient, precise and robust. Real-time accurate detection using support Vector Machine (SVM) algorithm without any wearable sensors makes use of this technology more comfortable and easy.
- ***Approach :*** SVM, KNN, Random Forest, Decision Tree, Naive Bayes, ANN, MLP
- ***Accuracy :*** Almost 99%

Literature Review:

Sign language is a language in which communication is based on visual sign patterns to express one's feelings. There is a communication gap when a deaf community wants to express their views, thoughts of speech and hearing with normal people.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** https://www.kaggle.com/datasets/grassknoted/asl-alphabet

Conclusion:

With an average accuracy of 99% in most of the sign language dataset using MediaPipe's technology and machine learning, our proposed methodology shows that MediaPipe can be efficiently used as a tool to detect complex hand gestures precisely. Although, sign language modeling using image processing techniques has evolved over the past few years but methods are complex with a requirement of high computational power

Future Work: Not Mentioned in Paper.

Paper - 04

Improving American Sign Language Recognition with Synthetic Data

Published Year: 2019

Abstract:

- ***Final Output:*** An ASL recognizer that can classify 50 signs using synthetic data generated from simple image manipulation of ASL video clips.
- ***Approach :*** K-means clustering with two types of features: hands 2D tracking and DeepHand handshape.
- ***Accuracy :*** 71.3%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this work, we explored different strategies for generating synthetic data with the goal of improving ASLR performance, and we experimented with several techniques for the automatic generation of synthetic data in varying amounts.

Future Work:

Experimenting with more synthetic data and techniques, defining boundaries of valid signs, adding noise and background variations, and extending to ASL sentences and paragraphs.

Paper - 05

Published Year: 2018

Abstract:

- ***Final Output:*** The paper presents a Convolutional Neural Network (CNN) model that translates images from the SSL hand alphabet to text, using transfer learning to adapt a pre-trained model to a small dataset.
- ***Approach :*** SVM, CNN
- ***Accuracy :*** 95%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

We have shown that classification of American Sign Language sign with the Intel RealSence Camera is feasible with accuracy & speed. While we have used static gestures only.

Future Work: Not mentioned in Paper

Paper - 06

Sign Language to Text-Speech Translator Using Machine Learning

Published Year: 2021

Abstract:

- ***Final Output:*** This study introduces a system that translates American Sign Language (ASL) to text-speech in real-time.
- ***Approach :*** ANN, ASL, deaf-mute, hand gesture
- ***Accuracy :*** 74%

Literature Review:

Proposed Hand Gesture Recognition Using Karhunen-Loeve (K-L) transform with this method they have also used CNN. For hand detection they used skin filtering, palm cropping to extract the palm area of hand and edge detection to extract the outline of the palm. Then feature extraction of the hand was carried out by using K-L transform method and image classification by using Euclidean distance.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

There are much research has been carried out in the field of machine learning and computer vision. They have contributed effective works which are very necessary and helpful for everyday life. Likewise, various research has been done on sign language recognition using different methods like neural networks, KNN, SVM and LSTM.

Future Work:

The system model can be improved in terms of accuracy by using different classification methods so that the model will recognize the alphabet even more accurately.

Paper - 07

A Real-Time Automatic Translation of Text to Sign Language

Published Year: 2021

Abstract:

- ***Final Output:*** Sign4PSL takes English language text as an input, performs the translation to PSL through sign language notation and displays gestures to the user using virtual characters.
- ***Approach :*** Sign4PSL.
- ***Accuracy :*** 80%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

Deaf people learn sign language as their first language for communication. They prefer information to be displayed in their respective sign language. The creator of PSL is the deaf people of Pakistan, and some signs are also borrowed from other languages. Limited research is done on PSL, and there is no proper grammar available for sign language.

Future Work:

Sign4PSL works for manual features of PSL by combining all the tools. It takes input in the form of text and plays corresponding signs. In Sign4PSL, HamNoSys is provided only for basic hand movements. It can further be extended as Sign4PSL supports other complex signs and non-manual features of sign language.

Paper - 08

SLIRS: Sign Language Interpreting System for Human-Robot Interaction

Published Year: 2017

Abstract:

- ***Final Output:*** Cyrillic manual alphabet, which is used for finger spelling in Kazakhstan.
- ***Approach :*** CNN
- ***Accuracy :*** 77.2%

Literature Review:

Hearing-impaired people around the world communicate via sign language, which uses gestures to express meaning and intent that include hand-shapes, arms and body, facial expressions and lip-patterns (Tolba and Elons 2013). Similar to spoken languages, each country or region has its own sign language of varying grammar and rules, leading to a few hundreds of sign languages that exist today (Aran 2008).

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this paper we utilized our previously developed method and applied it to a new application i.e. recognition of Cyrillic fingerspelling consisting of 33 manual gestures.

Future Work:

Not Mentioned in Paper

Paper - 09

VISION-BASED SIGN LANGUAGE TRANSLATION DEVICE

Published Year: Not specified in the document.

Abstract:

- ***Final Output:*** The system translates sign language to text in real-time using wearable sensors, with a focus on one-handed fingerspelling of ASL and BdSL.
- ***Approach :*** Image Processing, LABVIEW, Pattern Matching.
- ***Accuracy :*** N/A

Literature Review:

Sign Language (SL) is the natural way of communication of hearing and/or speech-impaired people. A sign is a movement of one or both hands, accompanied with facial expression, which corresponds to a specific meaning.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this work, a vision based sign language recognition system using LABVIEW for automatic sign language translation has been presented. This approach uses the feature vectors which include whole image frames containing all the aspects of the sign

Future Work:

To increase the performance and accuracy of the Automatic Sign Language Translator (ASLT), the quality of the training database used should be enhanced to ensure that the ASLT picks up correct and significant characteristics in each individual sign and further improves the performance more efficiently.

Paper - 10

Semantic Deep Learning to Translate Dynamic Sign Language

Published Year: 2020

Abstract:

- ***Final Output:*** In addition to adding semantics in dynamic sign language translation, the proposed system achieves good results compared to some dynamic sign language recognition systems.
- ***Approach :*** Three-dimensional Convolutional Neural Networks, ConvLSTM
- ***Accuracy :*** 97.4%

Literature Review:

Because of the importance of gesture recognition in computer vision and pattern recognition fields, many research works have been done in this context. Researches were done in dynamic ArSLR such as , proposed continuous Arabic sign Language recognition in user-dependent mode.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

This paper presented the first time to develop dynamic gesture recognition using deep learning and ontology with Cloud as a Computing environment. In this paper, we proposed a DGDSTS system for dynamic gesture semantic translation.

Future Work: Not Mentioned in Paper.

Paper - 11

Recognition of Bengali Sign Language using Novel Deep Convolutional Neural Network

Published Year: 2020

Abstract:

- ***Final Output:*** This architecture accomplished a general precision of 99.86%, which surpassed all prior works regarding Bengali sign alphabet recognition.
- ***Approach :*** CNN
- ***Accuracy :*** 99.86%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this work, we began with an alphabet dataset of Bengali signs for accurate identification of the Bengali sign alphabet. We applied our suggested CNN architecture and attained a total test accuracy of about 99.86%, exceeding all previous works' accuracy. We believe that our work will help mute deaf populations and more advancement in sign language identifications.

Future Work: Not Mentioned in Paper.

Paper - 12

Application of Machine Learning Techniques for Real-Time Sign Language Detection using Wearable Sensors

Published Year: 2020

Abstract:

- ***Final Output:*** The system translates sign language to text in real-time using wearable sensors, with a focus on one-handed fingerspelling of ASL and BdSL.
- ***Approach :*** CNN
- ***Accuracy :*** 96%

Literature Review:

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

This work presents ASL and BdSL alphabet recognition using data gloves. Recognition of both dynamic and static character of ASL and BdSL is possible using the developed system. Sign language modeling has also been discussed in this work.

Future Work: Not Mentioned in Paper

Paper - 13

Bengali Sign Language to Text Conversion using Artificial Neural Network and Support Vector Machine.

Published Year: 2017

Abstract:

- ***Final Output:*** This paper presents a novel system that converts Bengali Sign language to text using an optimum system comprising of artificial neural networks and support vector machine (SVM)
- ***Approach :*** Neural Network Model (NNM)
- ***Accuracy :*** 84.11%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this paper, isolated signs which refer to static gestures have been trained and tested using neural networks which made the work more reliable, since neural networks provide an adaptive learning technique with problem solving capability to complex real world problems.

Future Work: Not mentioned in Paper.

Paper - 14

A Deep Learning Approach for Recognizing Bengali Character Sign Language

Published Year: 2020

Abstract:

- ***Final Output:*** This model will avail for commencing to make Bengali sign language device interpreter
- ***Approach :*** CNN
- ***Accuracy :*** 92.7%

Literature Review:

In this paper, the main aim is to construct a model to recognize Bengali Character Sign Language using a deep learning approach CNN.

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

According to our research, we proposed a Convolutional Neural Network (CNN) model to recognize the sign language of Bengali character.The CNN model has been applied effectively to our constructed Bengali Ishara-Lipi dataset and achieved 92.7% with a minimum number of epochs. In the future, our research will be aiming to implement a more accurate model and develop a computer vision-based application for mute and deaf people.

Future Work: Not Mentioned in Paper

Paper - 15

Bangla Sign Language Detection using SHIFT and CNN

Published Year: 2018

Abstract:

- ***Final Output:*** Bangla Sign Language detection system which uses SHIFT & CNN to classify the hand gestures.
- ***Approach :*** SHIFT & CNN
- ***Accuracy :*** N/A

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this work, we began with an alphabet dataset of Bengali signs for accurate identification of the Bengali sign alphabet. We applied our suggested CNN architecture. We believe that our work will help mute deaf populations and more advancement in sign language identifications.

Future Work: Not mentioned in Paper.

Paper - 16

Real-time Bangla Sign Language Detection using Xception Model with Augmented Dataset

Published Year: 2019

Abstract:

- ***Final Output:*** A system which works in real-time by using Xception, trained with their BdSLInfinite dataset.
- ***Approach :*** CNN
- ***Accuracy :*** 98.93%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

We have proposed a system which works in real-time by using Xception [5], trained with our BdSLInfinite dataset. To achieve highly accurate results we have used a very large dataset for training, matching the real-life scenarios as much as possible. In the end, we got 98.93% test accuracy on average with 48.53 ms detection time, presented in Table I. In future, we would like to add word suggestions for the inputted alphabets and enable users to get the results in text and audio format as well.

Future Work:

In future, they would like to add word suggestions for the inputted alphabets and enable users to get the results in text and audio format as well.

Paper - 17

Real-Time Bangla Sign Language Detection with Sentence and Speech Generation

Published Year: 2020

Abstract:

- ***Final Output:*** The system helps to create a translator for BdSL.
- ***Approach :*** YOLOV4
- ***Accuracy :*** 97.95%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

Humans with physical disability of hearing and speaking faces problems in their daily life regarding communication. This paper aims to work for the welfare of people with physical impairment.

Future Work: Not Mentioned in Paper.

Paper - 18

Real Time Bangladeshi Sign Language Detection using Faster R-CNN

Published Year: 2018

Abstract:

- ***Final Output:*** The system helps to create a translator for Bangla Sign Language.
- ***Approach :*** Faster R-CNN
- ***Accuracy :*** 98.2%

Literature Review:

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion & Future Work:

In this paper, we have developed a system that would recognize Bangla Sign Letters in real time. Images of different BdSL signs from our BdSLImset dataset were trained by a Faster R-CNN based model to solve the problem of sign language recognition. We obtained average accuracy rate of 98.2 percent

Paper - 19

A Machine Learning Based Approach for the Detection and Recognition of Bangla Sign Language

Published Year: 2016

Abstract:

- ***Final Output:***
- ***Approach :*** HOG, SVM`, TTS, K-NN
- ***Accuracy :*** 86.53%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In this paper we propose a method for 16 predefined gesture recognition using HOG features. Considering large dataset and computational efficiency SVM is an efficient approach for decision making.

Future Work: Not Mentioned in Paper

Paper - 20

Bangla Sign Language Recognition using Convolutional Neural Network.

Published Year: 2017

Abstract:

- ***Final Output:***
- ***Approach :*** CNN
- ***Accuracy :*** 97%

Dataset:

- ***Properties***: couldn't find any dataset.
- ***Open source/public:*** N/A

Conclusion:

In the last decade, sign language recognition has been a challenging topic in computer vision and machine learning. In recent approaches, the continuous image is captured and segmented on the initial segmentation stage. Researchers considered the movement of hand gestures and facial expressions as an additional feature.

Future Work: Not mentioned in Paper.

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Table:

Paper	*Published Year*	*Approach*	*Accuracy*
1	2020	Flex sensors, MPU6050, Arduino Mega, and Python GUI.	95%
2	2021	CNN	85%
3	2021	SVM, KNN, Random Forest, Decision Tree, Naive Bayes, ANN, MLP	SVM = 99.15% KNN = 99.21% RF = 98.57% DT = 98.57% NB = 53.74% ANN = 97.12% MLP =94.69%
4	2019	DeepHand handshape	71.3%
5	2018	SVM,CNN	95%
6	2021	ANN, ASL, deaf-mute, hand gesture	74%
7	2021	Sign4PSL	80%
8	2017	CNN	77.2%
9	N/A	N/A	N/A
10	2020	3D-CNN, ConvLSTM	97.4%
11	2020	CNN	99.86%
12	2020	CNN	96%

13	2017	NNM	84.11%
14	2020	CNN	92.70%
15	2018	SHIFT & CNN	N/A
16	2019	CNN	98.93%
17	2020	YOLOV4	97.95%
18	2018	Faster R-CNN	98.2%
19	2016	HOG, SVM, TTS, K-NN	86.53%
20	2017	CNN	97%