Sign language Detection and Reorganization using Machine Learning

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ABSTRACT

Voice and Language is the main thing for human to communicate with each other. Due to hearing ability we can understand thoughts of each other. Even nowadays we can give commands using voice recognition. But what if one absolutely cannot hear anything and eventually cannot speak. So The Sign Language is the main com- municating tool for hearing impaired and mute people, and also to ensure an independent life for them, the automatic interpre- tation of sign language is an extensive research area. With the use of image processing and artificial intelligence, many techniques and algorithms have been developed in this area. Every sign lan- guage recognition system is trained for recognizing the signs and converting them into required pattern. The proposed system aim to provide speech to speechless, in this paper the double handed Indian Sign Language is captured as a series of images and it's pro- cessed with the help of Python and then it's converted to speech and text.

INTRODUCTION

We are motivated with aim to use new technologies for better humanity. We found Machine learning like technologies can be used for conquering the backwardness occurred because of this physical disability.
A random person if visited to deaf person and if deaf person is in problem and trying to explain it then it is very difficult to understand what exactly he is trying to say. Delay in detecting his Sign Language can turn into big critical problem for that deaf person. These kind of people can not spend normal life. They face communication issues at every point. Also they get boundaries and limitations to their dreams and professional aims. Hence they get demotivated and Inferiority Complex

Objective is to give them ability to be expressive in ideas and thoughts. They can get helped in increasing their motivation and confidence and it will help them to think positively and to conquer that physical disability. To develop system with using latest technologies and tools we are keeping objective to overcome from this global level problem. This system will definitely can be- come step into innovation of this global level problem solution. Our system can be Prototype and Proof of Concept for global level solution. This system can be used by Deaf and Deaf persons and also normal person can have this system with them and deaf person can perform sign in from of camera and sign can be converted to text or speech.

Software interfaces

Python: Python is an interpreted, high-level and general-purpose program- ming language. Python's design philosophy emphasizes code readability with its notable use of significant indentation. Its language constructs and object- oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (partic- ularly, procedural), object-oriented and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library. Python was created in the late 1980s, and first released in 1991, by Guido van Rossum as a successor to the ABC programming language. Python 2.0, released in 2000, introduced new features, such as list comprehensions, and a garbage collection system with reference count- ing, and was discontinued with version 2.7 in 2020.Python 3.0, released in 2008, was a major revision of the language that is not completely backward- compatible and much Python 2 code does not run unmodified on Python 3. With Python 2's end of-life (and pip having dropped support in 2021), only Python 3.6.x and later are supported, with older versions still supporting e.g. Windows 7 (and old installers not restricted to 64-bit Windows). Python in- terpreters are supported for mainstream operating systems and available for a few more (and in the past supported many more). A global community of programmers develops and maintains CPython, a free and open-source refer- ence implementation. A non-profit organization, the Python Software Foun- dation, manages and directs resources for Python and CPython development. As of January 2021, Python ranks third in TIOBE's index of most popular programming languages, behind C and Java, having previously gained sec- ond place and their award for the most popularity gain for 2020.

Spyder: Spyder is an open-source cross-platform integrated devel- opment environment (IDE) for scientific programming in the Python lan- guage. Spyder integrates with a number of prominent packages in the sci-entific Python stack, including NumPy, SciPy, Matplotlib, pandas, IPython, SymPy and Cython, as well as other open-source software.It is released under the MIT license. Initially created and developed by Pierre Raybaut in 2009, since 2012 Spyder has been maintained and continuously improved by a team of scientific Python developers and the community. Spyder is extensible with first-party and third-party plugins, includes support for interactive tools for data inspection and embeds Python-specific code quality assurance and in- trospection instruments, such as Pyflakes, Pylint and Rope. It is available.

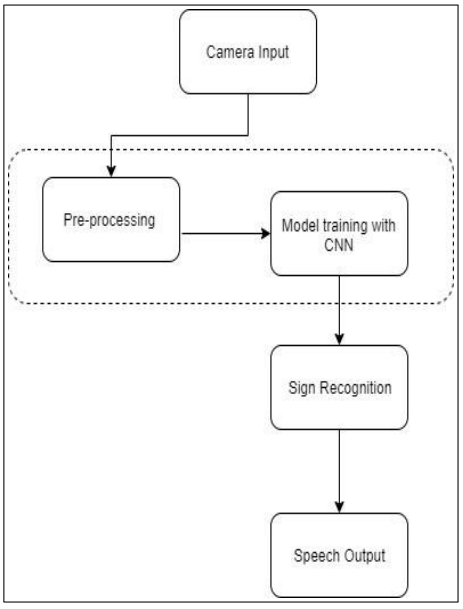
cross-platform through Anaconda, on Windows, on macOS through Mac- Ports, and on major Linux distributions such as Arch Linux, Debian, Fedora, Gentoo Linux, openSUSE and Ubuntu. Spyder uses Qt for its GUI and is designed to use either of the PyQt or PySide Python bindings.QtPy, a thin abstraction layer developed by the Spyder project and later adopted by mul- tiple other packages, provides the flexibility to use either backend.

DB SQLite: DB Browser for SQLite (DB4S) is a high quality, visual, open source tool to create, design, and edit database files compatible with SQLite. DB4S is for users and developers who want to create, search, and edit databases. DB4S uses a familiar spreadsheet-like interface, and complicated SQL commands do not have to be learned. Controls and wizards are available for users to: Create and compact database files Create, define, modify and delete tables Create, define, and delete indexes Browse, edit, add, and delete records Search records Import and export records as text Import and export tables from/to CSV files Import and export databases from/to SQL dump files Issue SQL queries and inspect the results Examine a log of all SQL commands issued by the application Plot simple graphs based on table or query data

Machine learning algorithms

CNN :-Artificial Intelligence has been witnessing a monumental growth in bridging the gap between the capabilities of humans and machines. Re- searchers and enthusiasts alike, work on numerous aspects of the field to make amazing things happen. One of many such areas is the domain of Computer Vision.The agenda for this field is to enable machines to view the world as humans do, perceive it in a similar manner and even use the knowledge for a multitude of tasks such as Image Video recognition, Image Analysis Classification, Media Recreation, Recommendation Systems, Nat- ural Language Processing, etc. The advancements in Computer Vision with Deep Learning has been constructed and perfected with time, primarily over one particular algorithm — a Convolutional Neural Network.

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning al- gorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in prim- itive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlap to cover the entire visual area.



EXISTING SYSTEM AND NEED FOR SYSTEM

In the existing systems, BSL uses a two-handed fingerspelling system, com- pared to the one-handed system used in ASL (and FSL). Many American Deaf believe that onehanded finger-spelling makes for faster finger-spelling than two-handed systems. However, anecdotal evidence has it that in a challenge between proficient ASL and BSL speakers, neither finger-spelling system proved to be faster; both finished reciting the alphabet at the same time. So that supposed "disadvantage" is rendered invalid. According to many Europeans, American signers tend to fingerspell "too much" compared to the rate of finger-spelling in many European sign languages, including BSL. This may be true; several examples of BSL signs for concepts that do not have a sign in ASL and are often finger-spelled for lack of a formal sign. This is one of the advantages of BSL, but that is not intrinsic to the language itself and it reveals a cultural value. On the other hand, that many BSL signs are often derived from their initialized (English) base, while many ASL signs have been developed without initialization (including the influence of signed English systems), so one might see that as a "disadvantage ".

Detecting Sign Language Characters in Real Time Using MediaPipe and Keras. Sign Language is a form of communication used primarily by people hard of hearing or deaf. This type of gesture-based language allows people to convey ideas and thoughts easily overcoming the barriers caused by diffi- culties from hearing issues

FUTURE WORK

In future work, proposed system can be developed and implemented using Raspberry Pi. Image Processing part should be improved so that In future work, proposed system can be developed and implemented using Raspberry Pi. Image Processing part should be improved so that System would be able to communicate in both directions i.e.it should be capable of converting nor- mal language to sign language and vice versa. We will try to recognize signs which include motion. Moreover we will focus on converting the sequence of gestures into text i.e. word and sentences and then converting it into the speech which can be heard.

CONCLUSION

Sign Language is a tool to reduce the communication gap between deaf-mute people and normal person. This system which is proposed above gives the methodology which aims to do the same as the two-way communication is possible. This method proposed here facilitates the conversion on the sign into speech. This overcomes the requirement of a translator since real time conversion is used. The system acts a voice of the person who is deaf-mute. This project is a step towards helping a specially challenged people. This can be further enhanced by making it more user friendly, efficient, portable, compatible for more signs and as well as dynamic signs. This can be further improvised so as to making it compatible for the mobile phones using the built-in camera of the phone. We can increase the distance at which it can be used by using a longer trans-receiver module or over Wi-Fi.

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