

Real Time Hand Gesture Recognition System

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Abstract: *With the rapid development of computer vision, the need to interact with the human machine is growing. Since hand gestures can convey rich information, hand gestures are widely used in robot control, smart furniture and other features [1][2]. Sign language is one way to communicate with deaf people. In these sets of functions, the features included and the linguistic diversity of the areas have been major obstacles that have led to small ISL research. One has to learn sign language to communicate with them. Learning often takes place in groups of peers. There are very few reading materials available for learning the signs. Because of this, the process of learning sign language is a daunting task. The first step is to learn to read a handwritten signature and, moreover, they are used if there is no corresponding sign available or the signatory is unaware of it. Most sign language tools are available using expensive external sensors. Our project aims to extend a step forward in the field by collecting data and using a variety of features to generate useful information to integrate useful information into various supervised learning strategies. Currently, we have reported four times the results of different approaches, and the difference in the previous work may have been due to the fact that in our four-fold verification, the verification set is accompanied by photos of a different person on the street. training set.*

Keywords: Data, Sign Language, Convolutional Neural Network, hand gestures

I. INTRODUCTION

With the advent of technology and the advancement of technology, the computer system has become a powerful machine designed to make human tasks easier. Because HCI (human communication - computer) has become an integral part of our lives. Now-a-days, advances and advances in computer technology have grown so fast that as human beings we could not even escape the consequences of this and it has become our big story. Technology is all around us and it has made so much of us in our lives that we use it for communication, shopping, work and even entertainment. There are many applications such as media player, MS-office, Windows image manager etc. requiring a natural and accurate interface. Now-a-days many users use the keyboard, mouse, pen, Joystick etc. sharing computers, is not enough for them. In the near future, existing computer-assisted technology, communication and display will be a hindrance and advances in this technology will be needed to make the system as natural as possible [3].

However, the invention of mouse and keyboard by researchers and engineers has been a great success, there are still cases where computer interaction with the help of a keyboard and mouse may not be enough [3]. With the advent of human machine interaction, computer interactions with humans are becoming more and more common. Among them, hand gestures are often used in this aspect [2]. With the wide range of hand gestures and the rich information contained in it, hand gestures have been used extensively in many fields, such as UAVs, somatosensory play, sign language recognition, and so on. In this regard, it is very important to carefully study the touch of the hand.

The paper-based interaction system is also composed of three components such as hand splitting, hand tracking and hand detection. With regard to the action of the touch action, it is characterized by cutting a special hand gesture into a single video frame, and which is the first step in achieving the touch gesture. It mainly covers types based on skin colour, edge detection, movement information, mathematical model with different advantages and disadvantages respectively. The paper uses a fusion algorithm to obtain the separation of the touch of the hands in a complex area [1][2].

Sign Language (ASL) can represent English A-Z characters using finger spelling. It can be one or two hands and ASL follows two portable styles. It was issued to represent words that do not have the same punctuation or that are used to emphasize a word Although spelling is limited in common manuscripts, it is an important factor in learning sign language. This project aims to identify the characters of the alphabet in American Sign Language from the corresponding touches. Recognizing the touch and recognition of sign language has been a well-researched topic but few published research activities related to American Sign Language (ASL). But instead of using advanced technology such as gloves or Kinect, we aim to solve this problem using modern computer-assisted technologies and machine learning algorithms.

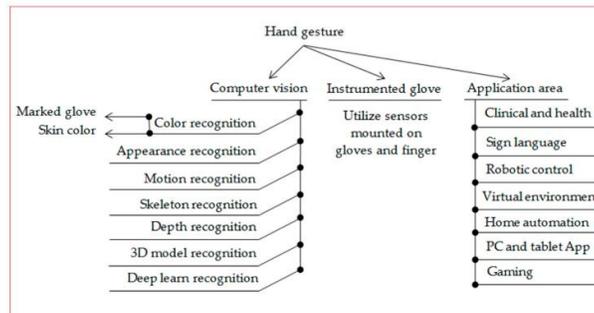


Fig. 1. Classification method

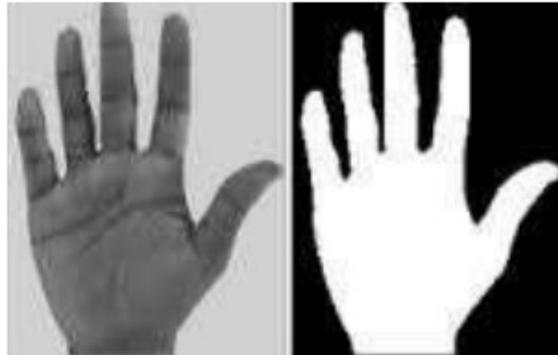


Fig.1.Segmented Hand Gesture

II. LITERATURE REVIEW

Paper-01: -Fourth International Conference on Electronics, Communication and Aerospace Technology (ICECA-2020) IEEE Xplore Part Number: CFP20J88-ART; ISBN: 978-1-7281-6387-1.

Personal Symbols will make communication more understandable and self-expression people are more likely to use touch, not only in our daily lives but also to gain an interest in the field of Human Computer Interaction (HCI) and computer perspective. Touch recognition involves identifying or revealing meaning from a human gesture that may involve gestures and facial expressions. Touch is classified as vertical and dynamic. Touch recognition is a way for different people with the ability to communicate with others. Touch detection algorithms can help the needy to close the gap and make communication easier. In the race to make computer communication natural and human touch is considered one kind. Most studies focus on detecting dynamic touches as they are more challenging than vertical touch perceptions. The root level of any flexible touch recognition system searches for those that represent the keys that best represent the flexible touch. The recognition algorithm relies on a key frame output algorithm to measure its performance. This paper aims to review those books that provide information on dynamic touch recognition and techniques for extracting key drafts and their pros and cons [4].

Sign Language Translator: Similar to word-for-word writing, a specific touch recognition system can understand symbols represented in sign language and convert them into text that makes communication easier [4].

Community-assisted robots: Touching can be used as an instruction to give logical instructions to a robot that will operate according to a specified signal. Today robots are given instructions in a natural way using natural inputs such as voice and touch as humans communicate [4].

Other computer communications: The keyboard and mouse used to interact with a computer can be switched on with a touch. This is mainly focused on researchers working under human computer communication [4].

Focused game technology: To make the game feel more natural Touch can be used [4].



Visual controls: Controlling other secondary devices in a car or directing a TV set is an example of such use of visual controls where a touch can be used to perform a control function [4].

Paper-02: - Gesture-Recognition-System-978-1-7281-1253-4/19 © 2019 IEEE

Gestures have a variety of gestures and postures such as eye movements, tone of voice and tone of voice etc. Generally, body language includes gestures. Hand gestures give a better impression of your words such as representing a number, expressing any emotion etc. Gestures are an essential tool for communicating in any sign language or for controlling a machine based on touch. Thus, an algorithm is designed that works to detect touch. voice sounds with body language symbols. Tone of voice plays an important role in communication but at the same time, different body language adds great value to communication. Even in a few cases, body language plays a very important role, such as communication between deaf and mute people or traffic signals, etc. In this paper, a description of the Position and Position is described [5].

Paper-03: -Multiplatform-System-for-Hand Gesture-Recognition-978-1-7281-5341- 4/19 ©2019 IEEE [6]

Analysis of the hand gestures helps to provide an alternative understanding what people are doing in videos of visually impaired or blind people or sign-language translation into text. Another example would be controls based on the interactions of other systems in the automotive industry, analysis of silent communications of criminals caught on camera etc. This paper focuses on touch and finger acquisition on still images and video sequences. This paper also contains a brief overview of the different ways to get a hand gesture and the realization of a standalone platform application written in Python using OpenCV and PyTorch libraries, which can display selected images or play video sequences with highlighted touches [6].

III. PROPOSED METHODOLOGY

Presently, with the recommended method, the expectations of getting the desired outcome is 0.95 which is adequate and be enough to make it acceptable to be used on high scale for the intended purpose. Also, for training the model with large datasets requires more memory resulting in large search space and high hardware computation. Researchers are still working in this field in order to provide high computation efficiency but most of the questions remained unanswered [7]. The project work is mainly implemented as follows,

1. Data Acquisition
2. Image Pre-Processing
3. Segmentation
4. Feature Extraction
5. Classification

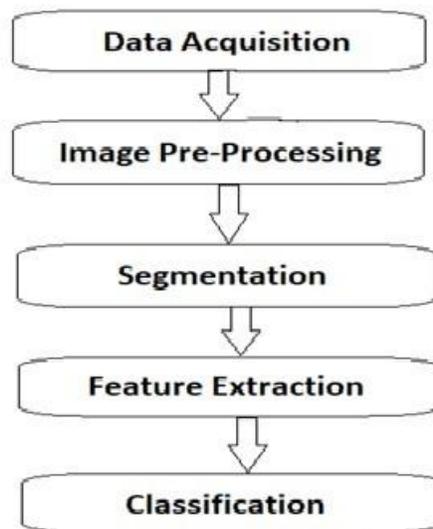


Fig 2. Flow Diagram for Gesture Detection



Sign-Based Recognition

The sign recognition process is divided into a number of categories named as data acquisition, pre-processing, classification, feature extraction and classification. Animation detection takes one photo frame. On the other hand, visual images are taken with a dynamic touch view. The only difference between the theory-based and sensory-based methods is data acquisition.

Data Acquisition

In visual-based identification, the information obtained is an image framework. The installation of such a system is collected using a hook and snap device such as a normal video camera, web camera, stereo camera, hot camera or highly advanced techniques such as Kinect and LMC. Stereo cameras, Kinect and LMC 3D cameras can store in-depth details.

Image Pre-Processing

Image Pre-processing steps in the process are performed to adjust the image or visual contact data to achieve the overall implementation of the structure. Indirect filter and Slide filter are a few of the most widely used procedures to reduce unpleasant image distortions or visual representations. In its analysis, non-line filtering is used only during that process. Histogram specification can also be used to improve the quality and brightness of processed images that are validated in different conditions. In the various analyses, the images used were either reduced or reduced to a single dimension before the next steps.

Segmentation

To separate the object from the background, this method is used. Here, your favourite place is cut from the whole picture. This method is categorized as contextual and non-contextual. But here, Contextual looks at local relationships but non-contexts do not. that every student in the class will be exposed to a camera lens. Face detection algorithms will be used on both cameras to analyse the face and mark their presence accordingly.

Feature Extraction

A feature release is the conversion of an important component of a processed file into the vector components of a solid attribute. In manual detection analysis, the extracted image features should contain important and relevant information.

Classification

The touch is then separated and matched to the database. The required output is then screen-generated. The model is still distributed online using streamlit.

HAND GESTURES DATASET	ALPHABETIC ACTION
	A
	B
	C
	D

Fig 3. Sign Language Dataset and their Alphabetical Representation

IV. CONCLUSION

The use of a touch gesture recognition system is a well-known practice in the community. It has attracted the attention of thinkers and experts. This research paper focused on presenting a research survey with a sign-language account that was then broken down into a number of processes, namely, data acquisition, Pre-Image processing, Separation and Feature Release. Despite the fact that this research cannot guarantee that it is comprehensive, it provides official information and provides a level of research in the field. There are some important results described in this research paper that were also part of our analysis. A separate paper using edge detection and the website contains many content features that are matched to predict hand movements. It processes both vertical touch and dynamic movement. Therefore, an easy-to-use and inexpensive method of identifying sign language with its precision and definition between deaf and dumb becomes easier [7].

V. FUTURE SCOPE

In the future, different hand gestures may be seen and used as inputs. Hand gestures that represent numbers can be converted into commands to perform related tasks in real time. To develop the ability to recognize various electrical conditions, encountered as a challenge in this project can be worked out in the future. The perception of hand gestures has now become a so-called natural part of human interaction and is one of the growing fields. It has emerged through a step-by-step process for example communication between specialized and disabled people has found a new life and in the same way and the second step has roots connected with intellectual practical communication between human and machine. Manual Activity is moving faster with the products and services of the future and big companies are developing technologies based on the touch screen system which includes companies such as Microsoft, Samsung, Sony and includes devices such as Laptop, Handheld Devices, Technicians. and LED lights. The stand includes where Gesture technology is available and will be seen in the fields of Entertainment, Artificial Intelligence, Education and Medical and Automated. And with more research and development in the field of Touch Recognition, use and adoption will be more expensive and cheaper. It is an excellent feature that converts data into features with a combination of technology and Human wave. Smart phones were dealing with a huge amount of Touch and Touch Awareness Technology and worked to manage the smartphone in reading, viewing and incorporating what we call small touches. Google Glass has been in the same category. And Technology is included among the smartest TVs today, which can easily control and manage Voice and Hand options. In the Medical field Hand Practice may contain information about the Robot Nurse and medical assistance. As Technology is constantly evolving and changing the future is not really predictable but we must make sure that the future of Touch Vision exists in order to live with the many and dramatic events that affect Life [8].

REFERENCES

- [1]. Jing-Hao Sun, Ting-Ting Ji, Shu-Bin Zhang, Jia-Kui Yang, Guang-Rong Ji. "Research on the Hand Gesture Recognition Based on Deep Learning", 2018 12th International Symposium on Antennas, Propagation and EM Theory (ISAPE), 2018
- [2]. www.ijsrceit.com
- [3]. Sharma, Ram Pratap, and Gyanendra K.Verma. "Human Computer Interaction using Hand Gesture", Procedia Computer Science, 2015
- [4]. Jhuma sunuwar, Samarjeet Borah, Ratika Pradhan. "Gesture Recognition Approaches and its Applicability: A Study", 2020 4th International Conference on Electronics, Communication and Aerospace Technology (ICECA), 2020
- [5]. Purna Sharma, Naman Sharma. "Gesture Recognition System", 2019 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU), 2019
- [6]. Tomas Bravenec, Tomas Fryza. "Multiplatform System for Hand Gesture Recognition", 2019 IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), 2019
- [7]. Juginder Pal Singh, Akhata Gupta, Ankita. "Scientific Exploration of Hand Gesture Recognition to Text", 2020 International Conference on Electronics and Sustainable Communication Systems (ICESC), 2020
- [8]. www.trendytechjournals.com