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SIGN LANGUAGE PREDICT USING M ACHINE LEARNING

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ABSTRACT

Sign Language Recognition (SLR) targets on interpreting the sign language into text or speech, so as to facilitate the communication between deaf-mute people and ordinary people. This task has broad social impact, but is still very challenging due to the complexity and large variations in hand actions. Existing methods for SLR use hand-crafted features to describe sign language motion and build classification models based on those features. However, it is difficult to design reliable features to adapt to the large variations of hand gestures. To approach this problem, we propose a novel 3D convolutional neural network (CNN) which extracts discriminative spatial-temporal features from raw video stream automatically without any prior knowledge, avoiding designing features. To boost the performance, multi-channels of video streams, including color information, depth clue, and body joint positions, are used as input to the 3D CNN in order to integrate color, depth and trajectory information. We validate the proposed model on a real dataset collected with Microsoft Kinect and demonstrate its effectiveness over the traditional approaches based on hand-crafted features

Keywords: Hand Gesture Recognition - Human Computer Interaction - Euclidean Distance (E.D) - Eigen Values - Eigen Vectors

I. . INTRODUCTION

Sign Language is the most natural and expressive way for the hearing impaired people. People, who are not deaf, never try to learn the sign language for interacting with the deaf people. This leads to isolation of the deaf people. But if the computer can be programmed in such a way that it can translate sign language to text format, the difference between the normal people and the deaf community can be minimized. Indian sign language (ISL) uses both hands to represent each alphabet and gesture. ISL alphabets are derived from British Sign Language (BSL) and French Sign Language (FSL). Most of the researchers in this area concentrate on the recognition of American Sign Language (ASL) since most of the signs in ASL are single handed and thus, complexity is less. Another attractive feature is that ASL already has a standard database that is available for use. When compared with ASL, Indian Sign Language relies on both hands and thus, an ISL recognition system is more complex. A few research works carried out by the researchers in the recognition of ISL. Currently, more researchers have started doing research in ISL. Here this proposed system is able to recognize the various alphabets of Indian Sign Language; this will reduce the noise and give accurate result. The important research problem in computer recognition is the sign language for enabling communication with hearing impaired people. This system introduces efficient and fast techniques for identification of the hand gesture representing an alphabet of the Sign Language. Currently, more interest is created to do research in the field of sign language recognition system. Deaf and Dumb people rely on sign language interpreters for communications. A real time Sign Language Recognition system was

designed and implemented to recognize 26 gestures from the Indian Sign Language by hand gesture recognition system for text generation. The signs are captured by using web cam. This signs are processed for feature extraction using some colour model. The extracted features are compared by using pattern matching algorithm. In order to calculate the sign recognition, the features are compared with testing database. Finally, recognized gesture is converted into text. This system provides an opportunity for a deaf-dumb people to communicate with non-signing people without the need of an interpreter. In the existing systems, BSL uses a two-handed fingerspelling system, compared 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 ". Nowadays, people are not interested to speak in ASL when having a deaf relative or friend, or even classmate/acquaintance. Hence, deaf people are often trapped and isolated. ASL requires the use of a person's hands so if something happens where a wrist was sprained and it disables that person from talking. For example, there was a mother who strained her wrist from signing all of her life for her deaf daughter. The doctor also made her stop signing. This caused the communication with her deaf daughter to decrease, since she had to read lips from then on.

I. OBJECTIVE:

Sign language, as one of the most widely used communication means for hearing-impaired people, is expressed by variations of hand-shapes, body movement, and even facial expression. Since it is difficult to collaboratively exploit the information from hand-shapes and body movement trajectory, sign language recognition is still a very challenging task. This paper proposes an effective recognition model to translate sign language into text or speech in order to help the hearing impaired communicate with normal people through sign language. Technically speaking, the main challenge of sign language recognition lies in developing descriptors to express hand-shapes and motion trajectory.

II. PROBLEM STATEMENT:

In particular, hand-shape description involves tracking hand regions in video stream, segmenting hand-shape images from complex background in each frame and gestures recognition problems. Motion trajectory is also related to tracking of the key points and curve matching. Although lots of research works have been conducted on these two issues for now, it is still hard to obtain satisfying result for SLR due

to the variation and occlusion of hands and body joints. Besides, it is a nontrivial issue to integrate the hand-shape features and trajectory features together. To address these difficulties, we develop a 3D CNNs to naturally integrate hand-shapes, trajectory of action and facial expression.

III. EXISTING SYSTEM:

However, this communication gap which has existed for years can now be narrowed with the introduction of various techniques to automate the detection of sign gestures.

Existing methods for Sign Language Recognition use hand-crafted features to describe sign language motion and build classification models based on those features. However, it is difficult to design reliable features to adapt to the large variations of hand gestures.

IV. DRAWBACKS:

1. It is difficult to communicate with deaf and dumb.

V. PROPOSED SYSTEM:

This paper aims to present a real time system for hand gesture recognition on the basis of detection of some meaningful shape based features like orientation, center of mass (centroid), status of fingers, thumb in terms of raised or folded fingers of hand and their respective location in image. The approach introduced in this paper is totally depending on the shape parameters of the hand gesture. It does not consider any other means of hand gesture recognition like skin color, texture because these image based features are extremely variant to different light conditions and other influences.

The system converts the Gestures video into simple words in English as well as make a sentence of that

each word in English. The CNN process used in the video processing module gives the matched results. Based on the right match, the Sign Writing Image File is retrieved and stored in a folder. This folder served as the input to the Natural Language Generation Module.

VI. ADVANTAGES

1.The system converts the Gestures video into simple words in English as well as make a sentence of that each word in English. The CNN process used in the video processing module gives the matched results

VII. MODULES

1.Image Acquisition

The gestures are captured through the web camera. This OpenCV video stream is used to capture the entire signing duration. The frames are extracted from the stream and are processed as grayscale images with the dimension of 50*50. This dimension is consistent throughout the project as the entire dataset is sized exactly the same.

2.Hand Detection

The captured images are scanned for hand gestures. This is a part of preprocessing before the image is fed to the model to obtain the prediction. The segments containing gestures are made more pronounced. This increases the chances of prediction by many folds.

3.Recognition

The preprocessed images are fed to the keras CNN model. The model that has already been trained generates the predicted label. All the gesture labels are assigned with a probability. The label with the highest probability is treated to be the predicted label.

VIII. CONCLUSION

The project is a simple demonstration of how CNN can be used to solve computer vision problems with an extremely high

degree of accuracy. A finger spelling sign language translator is obtained which has an accuracy of 100%. The project can be extended to other sign languages by building the corresponding dataset and training the CNN. The main objective has been achieved, that is, the need for an interpreter has been eliminated. There are a few finer points that need to be considered when we are running the project.

The sign language recognition system feasible for muted persons because of them can be communicated in deaf via this system. The system can capture hand gestures and navigate the words as in text format it will use for muted persons to see these words and understand the sentences.

IX. FUTURE ENHANCEMENTS

Future Enhancement is being planned to further analyze and enhance the protocol usable for blind peoples because they need to communicate with normal persons (using speech recognition).

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