Development of a Sign Language Translation Program

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・Introduction

Many able-bodied people can't understand sign language. For this reason, people who use sign language feel that it is difficult to have a conversation with able-bodied people. So, I wanted to make it possible for people who use sign language to be able to communicate directly with able-bodied people without the help from an interpreter when they want to say something. For my research, I created a program to translate sign language into text, making it possible for deaf people to easily communicate with able-bodied people, and for them to communicate directly and freely when they want to say something. By creating this program, I wanted to get closer to solving one of the problems the people who have hearing impairment have.

・Materials and Methods

I decided to use python to create a program to recognize hand gestures and to translate them into text. I divided the program's creation into three steps.
Step1: Recognize hand gestures using the camera function.
Step2: Let the program learn the hand movements and link it to text.
Step3: Have the program recognize the hand movements and display the linked text.
In step 1, I used the function "hands" in MediaPipe to recognize the hand gestures.
In Step2, I let the program python use NumPy and its complex mathematical functions in order to aid deep learning.
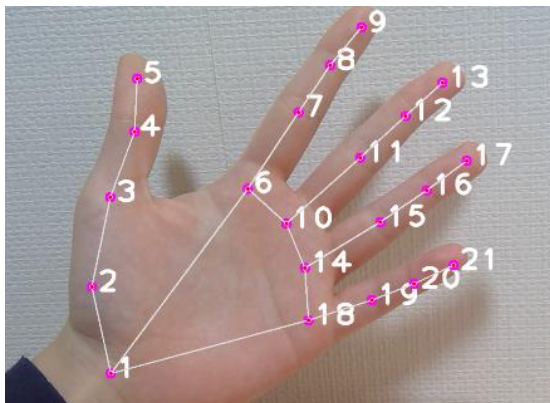
・Results

Figure1:Placing 'landmarks' on the joints of the hand.
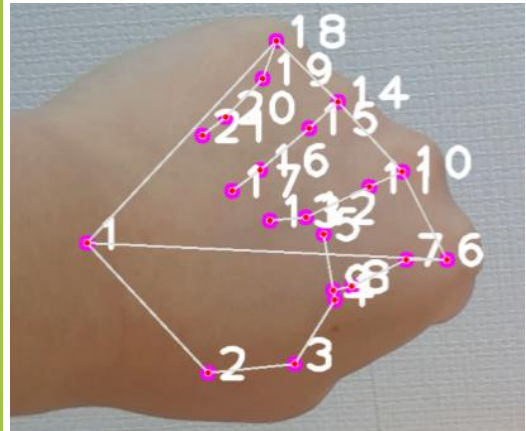In Step 1, the camera function could recognize hand gestures.

Figure2:Placing 'landmarks' on the back of the hand.
Also, the program could predict and recognize hand gestures even when it couldn't see the shape of hands by putting in points like in Figure 2. So, the program could not only recognize easy hand shapes but also recognize complex hand shapes.

・Conclusion

I think my program was able to recognize some hand gestures. If the program remembers the specific hand gestures or shapes that are assigned to a letter, word or number, then it will be easy to communicate. If points are assigned to the entire body, not just the hand, and the program is taught to recognize them, it may be able to recognize even finer body movements as I obtained in the results this time.

・Future Research

In the future, I will improve the deep learning using NumPy. I will collect a lot of data for deep learning. I will make the program display characters that were memorized on screen when the program memorized hand shapes. Eventually, I hope the program will recognize movements from all over the body in a similar way that my program could recognize hand shapes and gestures this time.

・References

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