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Dynamic manual alphabet and continuous recognition system for manual alphabet

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1 Introduction

Recently, it is needed to communicate between deaf people and hearing people as increasing opportunities that deaf people attend general community. But, many handicapped persons can't have enough communication because the number of the interpreter is very few. In order to solve these problem, we hope that many people learn sign language. In this paper, we construct system for learning manual alphabet that is based on sign language.

To confirm whether hand shape that user indicates is correct, we require to recognize manual alphabet. In former researches, they recognize static manual alphabet only. There is no recognition method for dynamic alphabet. Thus, we propose two continuous recognition method for both static and dynamic manual alphabet. One is All-Byes recognition method that recognize all of hand shape, direction and movement by Byes recognition method. Another one is recognition method with Byes and distance. This is the method that recognize only hand shape by Byes recognition method, direction and movement by calculated distance. The recognition performance of continuous manual alphabet are discussed in detail.

2 Manual Alphabet

Manual Alphabet classify as static manual alphabet or dynamic one. Dynamic one require to recognize hand shape, direction and movement. Since the manual alphabet has

complicated shapes, we have recognize the bending and stretching status of every finger. In this paper , we use a hand gesture interface device that can measure shapes of fingers and FASTRAK that can measure three-dimensional position and rotation angle for x, y and z axis.

3 Continuous recognition by All Byes recognition method

We can recognize static manual alphabet using hand shape and direction. But ,to recognize dynamic manual alphabet, we require hand shape, direction, and movement. We propose All Byes recognition method that consider all of hand shape , direction and movement. This method is easily to divide manual alphabet and consider same alphabet both static manual alphabet and dynamic one.

4 Continuous recognition by recognition method with Byes and distance

The real-time processing is very important for the recognition of continuous manual alphabet. All Byes recognition method using 24 dimension of hand shape , direction , movement is technique which is necessary for the big database. To application to system for support learning manual alphabet, we require to achieve the real-time recognition. Therefore, we propose recognition method with Byes and distance. It is the method that decrease the number of dimension of All Byes recognition method. We have examined the recognition performance. As a result, computational complexity is decrease, and recognition ratio of recognition method with Byes and distance hardly decrease than that of All Byes recognition method.

5 System for support learning manual alphabet

As spreading information machine, many learning material and electronic dictionary with CD-ROM have been selling. These system for support learning sign language is using real image and animation. However, it is difficult for user to recognize hand shape, for being similar to hand color and face color. Thus,it is the problem that user can't learn correct hand shape.

In order to solve these problem, we construct system for learning manual alphabet that is based on sign language, using CyberTouch that is hand gesture interface device with vibratory tactile feedback. If user indicate wrong hand shape , the vibratory actuators are vibrated. Thus, the system can be instruct user mistakes directly.

6 Conclusion

In this paper, we have constructed system for support learning manual alphabet. It is the system that the vibratory actuators are vibrated if user indicate wrong hand shape. Thus, user can learn the correct manual alphabet.

To confirm whether hand shape that user indicate is correct, we require to recognize manual alphabet. As recognition method of continuous manual alphabet action including dynamic manual alphabet, we have proposed All Byes recognition method, and examined the recognition performance. All Byes recognition method achieves a recognition rate is 95.02%. But recognition method requires that computational complexity gets fewer. Therefore, we propose recognition method with Byes and distance that decrease the number of dimension of All Byes recognition method. As a result, recognition method with Byes and distance achieves a recognition rate is 94.37%, can decrease computational complexity.

Future work is to construct system for support learning sign language that is application of system for support learning manual alphabet.