

Nonverbal Communication Technology for Human-Computer Interaction



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Research Fields Pattern Recognition, Image Recognition

Keywords Face Tracking, Facial Expression Recognition, Lecture Support System

● Research Outline

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In human-computer interaction, verbal information is often used. On the other hand, in the interaction between human beings, nonverbal information such as facial expression and gesture represents 93% of all communication. If computers can recognize nonverbal information, natural human-computer interaction becomes possible. At my laboratory now, we do research on face tracking, facial expression recognition and gesture recognition using image processing technology to realize natural human-computer interaction. Additionally, we have developed the application system of nonverbal information.

Face Tracking Using Particle Filter Based on Multiple likelihood

The aim of this study is to realize a robust face tracking method to change of face direction and to change of head tilt. Our method of face tracking uses particle filter. Our approach evaluates the likelihood for a particle based on score of support vector machine (SVM). The reason for this is that SVM is one method with high discriminate performance. However, if an object occlude a part of the face, face tracking is not working. Therefore, our method uses not only SVM but template matching to estimate the likelihood. As a result, face tracking becomes possible as shown in Fig. 1.



Fig. 1 Face tracking

Extracting Importance of Slides in a Lecture Review System

In this study, we propose a method for extracting importance of slides in a lecture review system as shown in Fig. 2. We introduce "index of importance" to quantitatively evaluate the importance of slides. The index of importance is the subjective evaluation value that is attached to each slide by lecturers. Firstly, the lecture review system extracts the index of importance of the slide by using a multi-layer neural network (MLN). In an MLN learning process, eight types of nonverbal information, such as presentation time of the slide, are used as inputs and the indexes of importance given by lecturers are set as outputs. Secondly, the index of importance is modified by using the other MLN which has two types of inputs; one is the index of importance and the other is the similarities between the slide and adjacent slides. The similarities are calculated with keyword vectors extracted from verbal information in the slides. The experimental results showed that the index of importance extracted by the system is highly correlated with the index attached by lecturers. As a result, the lecture review system with the proposed extraction method can properly detect key slides and helps students to learn the contents of a lecture effectively.

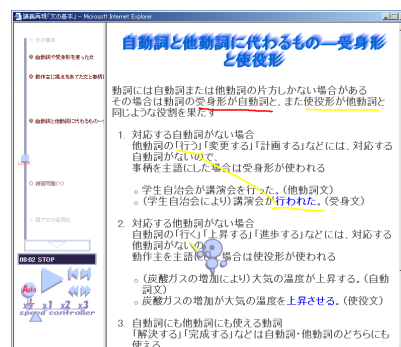


Fig. 2 Lecture review system