2020 CUxKAIT Online Workshop on November 26, 2020

Human-Machin Interaction based on Eye Movements and Voice Conversation

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Background: Followed by the increasing elderly rate and decreasing birth rate in the Japanese society, working places of robots and autonomous systems are expanding from manufacturing plants to our living space such as home, care institutes and hospitals. Robots working in these places are desired to be intelligent enough to interact with not only adults but also children and old people who are not familiar with technologies. However, it is unclear how to design the interaction in order to attract people with rich of emotion and behaviors.

Purpose: We propose a scheme of human-machine interaction based on eye movements and voice conversation. A target of this study is to uncover physiological and psychological effects given by gaze and voice interaction. We designed gaze and voice interaction systems in order to measure audio-visual data from human subjects for the analysis.

Method: The gaze interaction system is composed of a computation unit, eye tracker and expression display. The system is capable of showing four patterns that represent the emotional expressions of surprise, anger, joy and sadness, respectively. The voice conversation system is composed of a computation unit, microphone and speaker. The system is capable of generating phrases of questions as well as recognizing the answered numbers that indicate the answer choices.

Results: In experiments of gaze interaction, the experimental results showed that the expression of anger and sadness gave influences to fluctuate point of gaze and induce blinking more than the cases of joy and surprise. In experiments of voice interaction, the experimental results showed that voice interaction gave influence to elevate subject's awakening, and this seems to be effective for prevention of apathetic mood and dementia of old people in future.

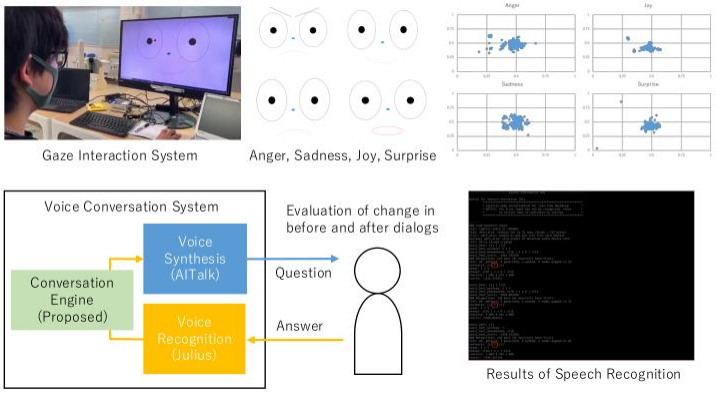


Figure: the gaze interaction system (top figures) and voice conversation system (bottom figures).



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