

Analysis of Relation between Facial Emotions and Comprehension Level in Listening

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1. Background & Objective

- When communicating with others, people should speak in a way that the others can comprehend.
- If people realize that the audiences might not comprehend what they just said, they can adjust their speeches by adding explanations or changing their expressions.
- We guess that **people can judge whether they are being comprehended by looking at audiences' facial emotions.**
- A user interface was implemented to estimate human emotions from facial images.
- **Evaluation experiments were conducted by measuring participants' facial expressions while listening to two difficulty levels of English listening tests.**
- The emotion distributions were analyzed to find the relation between facial emotions and comprehension level.

2. Implemented User Interface

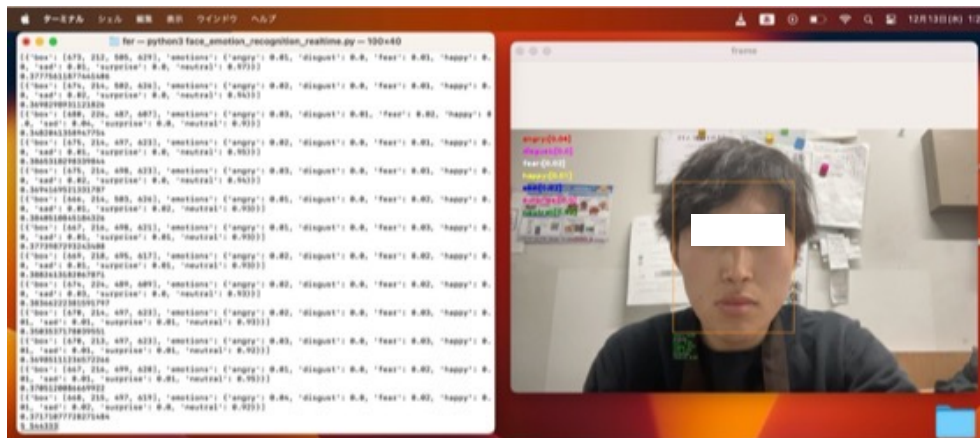


Figure 1. Implemented user interface

- (1) The implemented interface first detects a facial area in a captured frame (three times in a second).
- (2) The facial area is used for facial emotion estimation.
- (3) The likelihood distribution of seven emotions is outputted for each frame.

3. Evaluation Experiments

- **The participants were 10** undergraduate/graduate students (8 male and 2 female, 18-22 years old).
- All of them were Japanese and **their native language was Japanese.**
- The experimenter used past **English listening tests** of Eiken Test in Practical English Proficiency (like TOEIC and TOEFL).
- The listening test had **10 questions.**
- The duration for answering was **10 minutes.**
- The experimenter chose listening tests from two difficulties of Level 1 and 4 as difficult and easy listening tests, respectively.

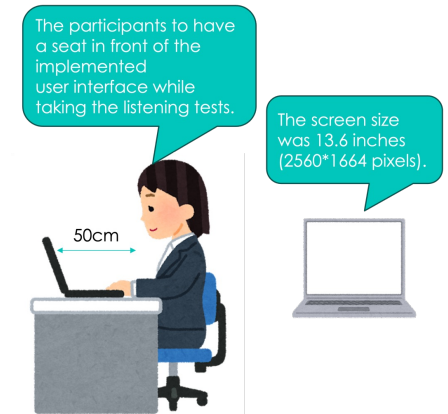


Figure 2. Experimental settings

4. Results & Findings

Table 1. Averaged likelihoods of seven emotions.

	Easy:correct	Easy:incorrect	Hard:correct	Hard:incorrect
Angry	0.061	0.088	0.162	0.081
Disgust	0.002	0.001	0.023	0.007
Fear	0.085	0.059	0.07	0.068
Happy	0.015	0.012	0.003	0.005
Sad	0.189	0.272	0.24	0.222
Surprise	0.01	0.001	0.006	0.005
Neutral	0.609	0.521	0.492	0.605

From the experimental results, we found the followings:

Table 2. Relation between facial emotions and comprehension level in listening

	Comprehended	Not comprehended
Easy for listening	Neutral	Neutral, sad
Hard for listening	Multiple emotions	Neutral