Developing a Component for Real-time Emotion Recognition

Long T. Cung
Hanoi University of Technology
NII Internship Student

Nikolaus Bee
University of Augsburg
NII Internship Student

Helmut Prendinger
National Institute of Informatics

Aim of Research

- Develop an Emotion Recognition Component (ERC) which can recognize user's emotion status in real time
- Implement the interaction between ERC and user via a friendly interface ("mirror" application)

Field of Research

- In this research, we develop novel methods for processing biometric signals in real-time and interpreting them as affective states. A key challenge is to account for both individual bio-signal properties such as different latency periods as well as duration-related properties of different emotions.
- As an example scenario, we implement empathic between a 3D agent and a human user. Agent expresses user's emotion status and adapts its behavior depending on the user's detected emotion state.

Output

A system of emotion mirror with abilities:
- Recognize two emotional states of user in real time – relaxed happiness and frustration
- Announce user's emotion status via a 3D agent with voice and body gesture

Research Description

1. Data Collection

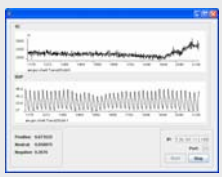
Skin conductivity and heart rate of user are collected by using ProCom device with SC and BVP sensors

Figure 1. SC sensor and typical SC waveform

Figure 2. BVP sensor and typical BVP waveform

2. Emotion Detection

* Data is online processed. The first forward difference features are calculated and compare with the thresholds
* Bayesian network is used for classification



Interface of ERC

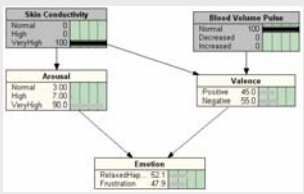


Figure 3. Bayesian network for Emotion Classification

3. Emotional States Expression

Modified "Greta" is used as interface of system for showing emotion status of user. We can also view raw SC signal and raw BVP signal of user via another window of the system.

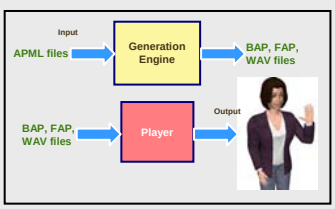


Figure 4. Greta and its typical function

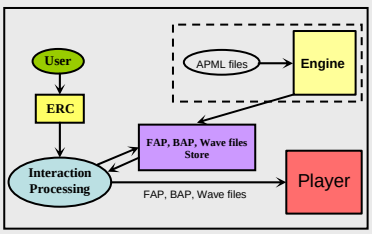


Figure 4. Modified Greta and its "Emotion Mirror" application

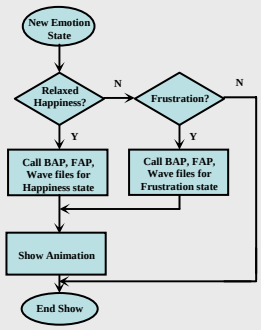


Figure 5. Interaction Processing

4. Future Work

* Implement the system with more type of bio-sensor – SC, BVP, EMG, ECG, …
* Integrate information from speech or eyes and physiological signals to develop a new Real-time Emotion Recognition Component
* Develop a Human-Machine Interface system with a smart 3D agent which has ability of conversation

Neutral

Frustration

Relax Happiness

NII
Helmut PRENDINGER
TEL : +81- 3 - 4212-2650 FAX : +81- 3 - 3556-1916 Email : helmut@nii.ac.jp