

Emotion Based Recognition for Miyazawa-Kenji Virtual model

HAMIDO FUJITA, JUN HAKURA, MASAKI KUREMATU

Faculty of Software and Information Science

Iwate Prefectural University

Iwate, 020-0193

JAPAN

<http://www.fujita.soft.iwate-pu.ac.jp/>

Abstract: - This paper contributes in presenting an outline of Virtual Miyazawa Kenji (MK) systems to realize the cognitive interaction between human user and Kenji Virtual system which realizes, factorizes and conceptualizes the virtual reasoning of famous Japanese story writer namely Miyazawa Kenji. Here we are outlining the system parts and explain the main concept on its building. There are other two papers submitted with this publication explaining the other two aspects related to fiscal reasoning process and voice (speech) reasoning process.

Key-Words. Miyazawa Kenji, cognitive reasoning, Ekman emotional model, psychological reasoning, intelligent human interaction.

1 Introduction

In this paper, we are presenting our project related to the construction of Virtual Miyazawa Kenji

<http://www.kenji-world.net/english/who/who.html> . A Preliminary outline of this project has been presented in WESEAS transactions [1] .

This paper shows more details on the main four parts on extraction and design of Emotional feature presentation of Miyazawa Kenji.

The system we are proposing is not a thinking machine or problem solving system. This cognitive behavior reasoning system interacts with human user based on cognizing-based reasoning and factorized through based on Miyazawa Kenji (MK) cognitive studies.

Our system thinks on which action it may take to appropriately interact with the user. This decision making process is based on MK thinking style.

Adelmann and Zajonc[5], in a review of theoretical and empirical literature, posited five conclusions relative to facial emotional actions. First, they claim there are no grounds to reject any theory on facial reference in the experience of emotion. Second, there is a positive association between facial efference (bring outward) and emotional experience. Third,

facial efference plays both a modulating and an initiating function in the experience of emotion. Fourth, the facial feedback hypothesis does not explain why facial expressions feel good or bad, and finally, the term facial expression may misrepresent the role of the face in emotion.

There is a need to reason on pattern related to how to view person mental patterns (from MJ point of view), in the same as physical pattern discovery to determine the physical condition of a person from physical patterns recognition through specialist (we show this on Sec.4). The reasoning in our side is rather more or less deliberately creative than it falls into procedural mechanism. The way in which we use our mind becomes the way in which we use our body and the attitudes of mind so that to create its own manifestation in the function of the muscles that implements deliberately the concessions behavior behind it. Previous or old thoughts (from Aristotle to Darwin) saw facial expressions as the result of internal emotional states. Facial expressions were seen as pre-warning of emotional responses on others. However, why do humans need such non-verbal communication and complex facial muscles when we have language? Darwin tried to extend his theories on evolutions of structures to

behavior. He felt that behavior also evolves, and concluded from the universality of many facial expressions (sadness, happiness, etc.) that such behaviors also evolved from lower life forms. Facial expressions are "serviceable habits" that helped the organism react to sensations and internal states.

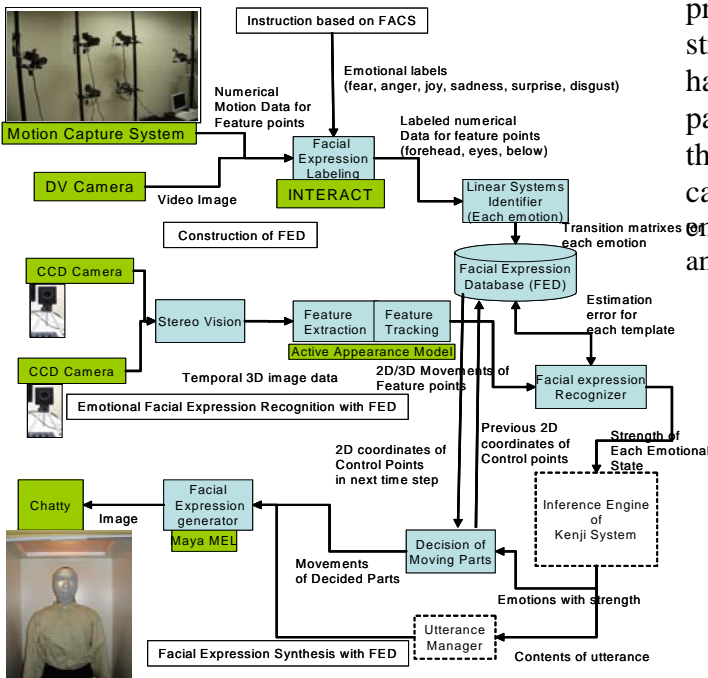


Fig.1., General structure of Virtual Kenji system.

Minsky[2] in his recent book on chap.9 has mentioned on the self, as mechanism to logic on how to define or represent and put in structures the self to reason cognitively on it. These initiatives are interesting to reorganize our thought to build MJ cognitive engine to interact with human user based on MK as shown in Sec. 3.

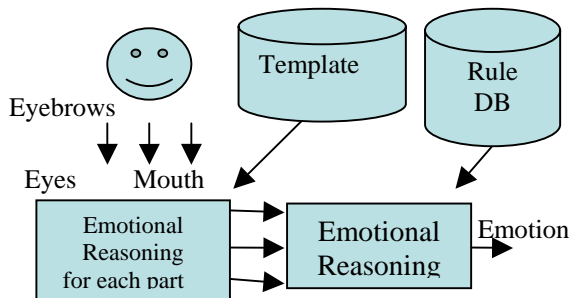


Fig. 2. Facial database system creation(Part_1_)

2. Emotion Database Construction

1st part is creating database for gesture analysis. In this part human is used to make this experiment using Motion Capture system installed in our Laboratory (see Fig. 1). This section has been explained in another paper presented with this publication. The general structure of our system is as shown in Fig.2. we have partitioned human user' face into three parts, Eyes, eyebrows, and mouth. We extract the emotional feature of each part by categorizing each part into six universal Ekman emotional states, (sad, happy, digest, surprise, fear and anger)[3].

To construct the gesture databases for our purposes, we have used motion capture analysis to trace and track human user to collected cognitive emotional gesture categorized or classified according to six Ekman emotional model.

The emotional recording and classification is based on vector data analyzed for template extraction. The templates will be used for such reasoning process.

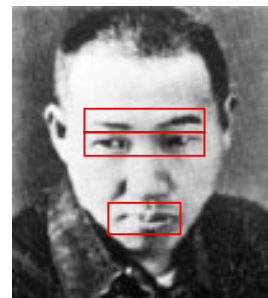


Fig.3. Face parts

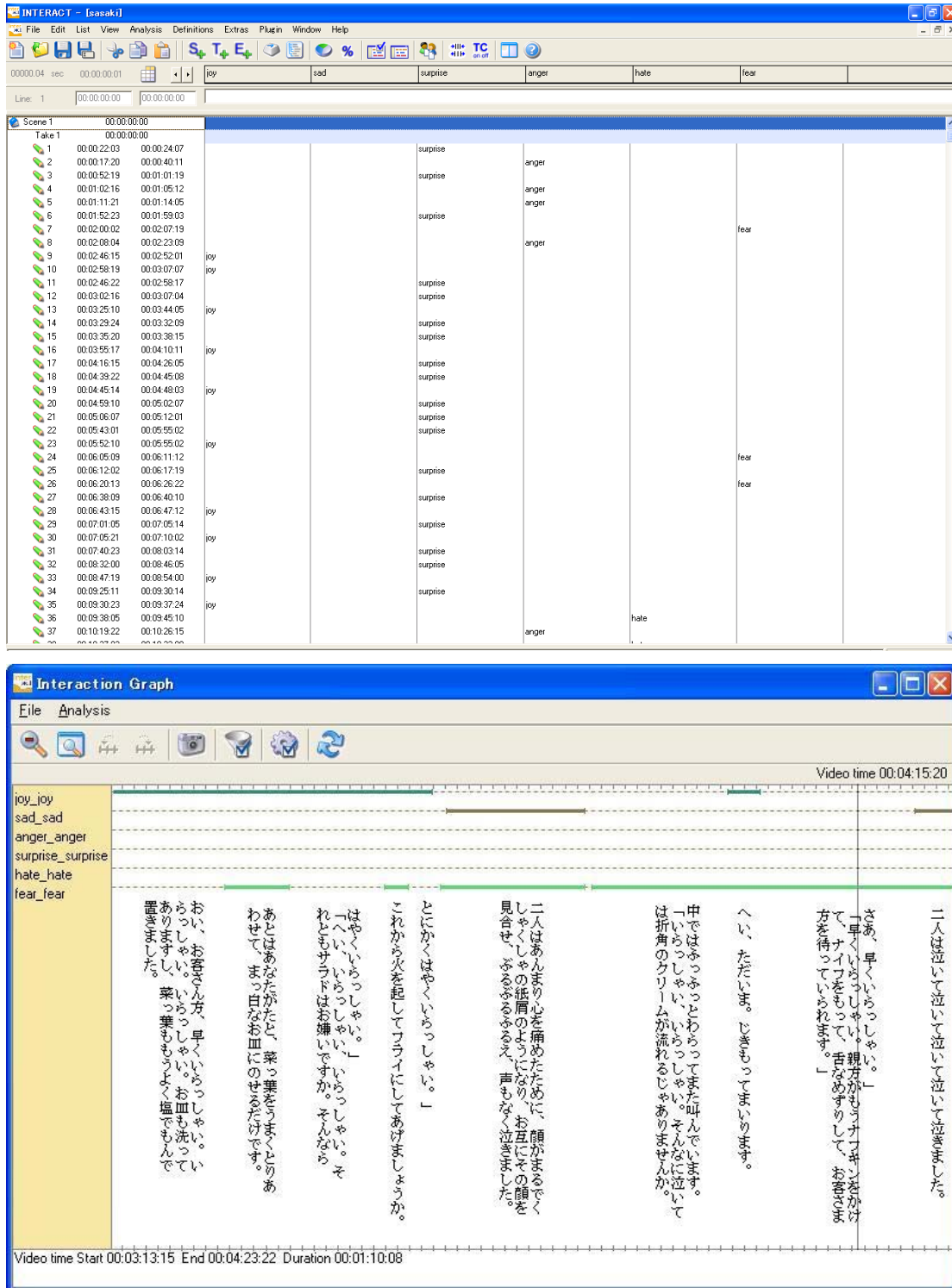
3. Kenji Style extraction model

Kenji style is the emotional voice and fascial animation that virtual kenji be able to use to speak (read kenji scripts) to the user. These are the extracted cognitive feature reasoned templates.

As stated in the introduction, we need to construct creatively and physiologically Kenji style featured by his personality implicitly hidden between his scripts and from scholars who have acquaintance on his personality reflected through his published artwork. This 2nd part is to create Kenji style. This style is constructed from collected data from testing actual person act and that have some knowledge

on Kenji scripts, and from general person who can read Japanese scripts. The analysis

what we called Kenji-Style templates. This is the self-reasoning of Kenji.



outcome is based on six Ekman FACS universal labeling through these collected data, this outcome and analysis could contribute to create

Fig. 4., INTERACT based Labeling

We use such style of reasoning to label and understand on how to use the gesture created by Part 1 explained in Sec.2. We have selected for this experiment Kenji scripts named as “Chumon OI Riyori Ten; http://www.aozora.gr.jp/cards/000081/files/43754_17659.html (Japanese). The same scripts “The Restaurant of Many Orders” <http://www.kenji-world.net/english/works/texts/restaura.html> (English).

The analysis of Kenji scripts. is based on cognitive feature extraction referenced on reading of above mentioned Kenji scripts (1) by

video to extract the emotional features in terms of six Ekman model. As you can see through this Fig.4, the Japanese scripts of Kenji and its emotional reasoning have been labeled, based on reasoning of actual user act.

Moreover, in both cases the analysis are to label the reading on 6 colors bases; corresponding to Ekman six emotional cognitive states, and labeled accordingly by all users.

The extraction and labeling is collectively compared and analyzed so that creatively the best selected Kenji style is selected and collected. Creatively means the best way to

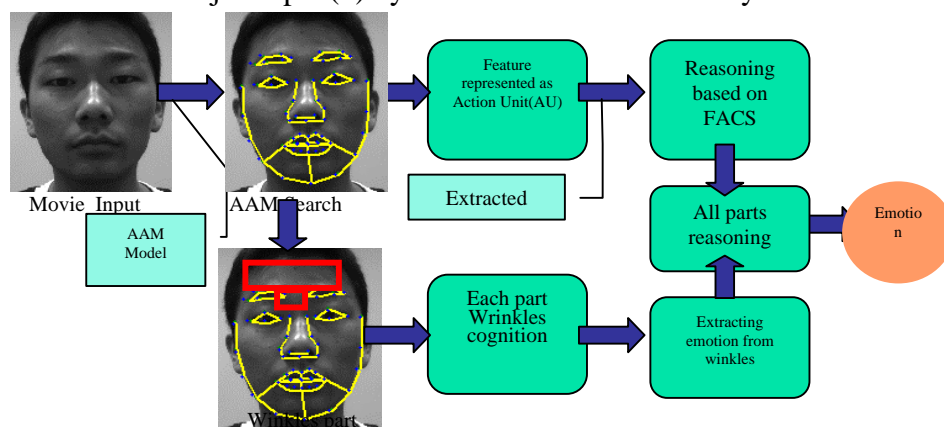


Fig. 5.. the emotion extraction from wrinkles

specialist in Kenji literature and scripts work. As well as by (2) reading analysis on non-expert work, (i.e., general Japanese user).

In case (1) above. The analysis is to video record the user act reading. Also, the user will label the scripts on paper, using six colors (each representing the six universal Ekman cognitive model), according to his/her cognitive understanding. We have currently five experts on this experiment.

In case (2), above we have also the same procedure as in (1) above, but using around 50 Japanese national persons. (Japanese users who have just general common sense understanding on kenji).

The video collected in both experiments have been analyzed using INTERACT software. Fig.4 shows the labeling of the collected video recording reference to the six Ekman universal model. Fig.4 Shows how to use INTERACT to label the physiological behavior of the recorded

select the best patterns from the matched sequences that reflect the best behavior that acting on these scripts. Having the same scripts being acted and played from different prospective creates the multi-view analysis on different reasoning aspect on the scripts through the universal Ekman model. Also, we could create several more than one version of scripts reading on Kenji system that have been evaluated for the best performance from general common sense point of view. We think that this process still needs more elaboration the current stage of this experimental research. The templates data based created in Part 1(Sec.2) are used to reference to Kenji style. Through these two parts we have had our Hologram(shown on Fig.1), to act on behalf of Kenji and talk in real-life picture on Kenji script with emotional appearance. The voice collection is the same as well. The sound utterance and pitch have also be collected from the experiment mentioned in

Sec.2, and these wave sound files have been integrated on the animated generated gestures using *Alias Motion builder* software application, which could

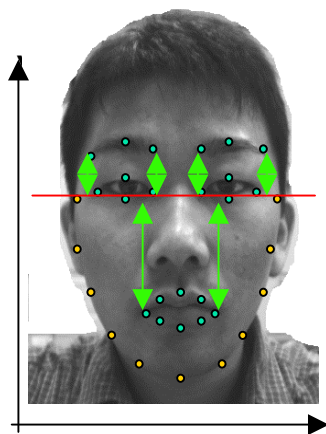


Fig. 6. Line assignment for emotion extraction

integrate our sound wave files on the generated Maya 8, animated video on Kenji hologram doll. The sound related generation process is shown in another paper submitted with this version. The generated output will be based on Maya software, animated images creation that based on Kenji style[7]. Other Section is to discuss how to make the cognitive gesture database that reflect the emotional Facial and sound data. Based on this animated database Virtual Kenji that talk to the user, through his acting Scripts, These Script will be practically read to the user asif Kenji is speaking them to the user through animated facial image reflecting to the emotional status of Kenji scripts, using what is called as *Kenji style*. The sound files and image files are categorized and indexed through Ekman 6 model[6].

system. The user looks to the Virtual Kenji talking through his acting scripts. Kenji system is watching the user engagement and the

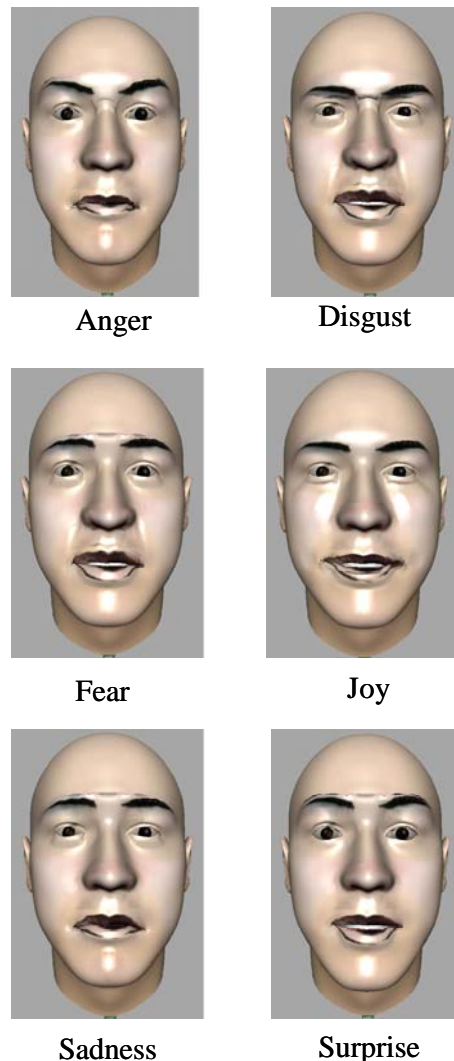


Fig. 8, shown the universal Ekman recognition harmony level, as evaluation process to examine the user emotional engagement and its related consistency with Kenji acting through virtual

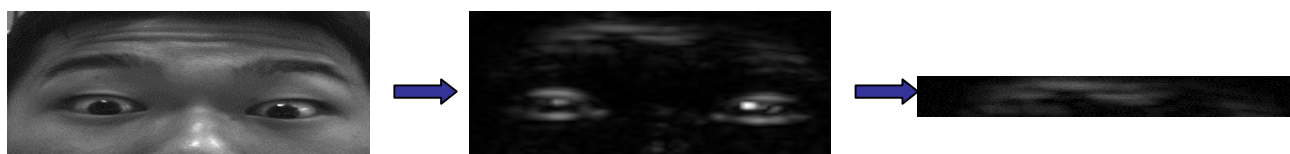


Fig.7, show how AAM regnized image be converted using Gabor fliter to regnize

4.Look and Feel

This part has been designed to look to the human user who is sitting in front of Kenji

Kenji system. Two Stereo Cameras have been set to observe and record user facial and emotional images and reason upon them as shown in Fig.1. The analysis of the user

behavior and his/her engagement weight will be based on wrinkles' changes evaluation on user face. Fig. 5 shows how we could extract emotion from the wrinkles of user engagement with virtual Kenji system. The active appearance model is to locate the face's parts for recognition process. For each part the recognized movement has been referenced to the corresponding action unit that reflects the visible facial emotional change feature of that part; for example AU1 corresponds to the inside eyebrow is raised action. A reference line is decided (Fig.6) and it relates to AU that changes in a distance from this point to the new position on each point change. Then from recognized AU the corresponding AU is recognized. The recognition will be based on Gabor filter extraction algorithm shown on Fig. 7.

The action unit related process is how to create the real time output on the hologram. The output means; animated emotional facial image reflecting the cognitive behavior of Kenji act according to his script related cognitive reasoning. There are basically, around 17 action units that collectively can be categorized correspondingly, into six categorized universal emotional model. The outcome of it can be shown in Fig. 8. There are feature extractions related to: Eyes, brow, cheek, wrinkles, and lips. These can be parameterized into upper face and lower face parameters extractions that reflect the Upper face group action unit and lower face group action unit[7].

This reflects how using such parameters to extract the recognition of the emotional behavior which we could reason through as an output on the hologram in animated images as shown on Fig. 8, and Fig.1.

The sound recognition related part on this paper is given in another paper submitted with this publication. The generated sound reflects the emotional behavior of the Kenji speaking sound with emotional features reflected from the analysis and reasoning on his scripts [6].

5. Conclusions

This paper outlines Miyazawa Kenji cognitive model, as test experiment for human cognition

and user interaction based on emotional behavior of Miyazawa Kenji model.

This research outline is an experimental work to model Miyazawa Kenji cognitive behavior based on his scripts emotional extraction and on common sense observation related to the behavioral analysis of human appearance and understanding on MK scripts. We think this work can explore a wide type of problems that can open a wide range of challenges to solve problems that can have computer system be able to tune its response and action to our emotional behavior for best engagement performance. This is necessary for our old aged society that need computing machine be emotional to our needs and capable for adaptability to our emotional states.

References:

- [1] H. Fujita, J. Hakura, M. Kurematsu, Virtual Cognitive Model for Miyazawa Kenji Based on Speech and Facial Images Recognition, *WSEAS Transactions on Circuits and Systems*, Issue 10, Vol.5, 2006, pp. 1536-1543.
- [2] Marvin Minsky, *The Emotion Machine*, Simon & Schuster publisher, 2006, ISBN: 978-0-7432-7663-4
- [3] D. Keltner and P. Ekman "Facial expressions of emotion", *Handbook of Emotions*, Guilford press, pp.236-249, 2000.
- [4] Trademark software by Mangold International, <http://www.mangold-international.com/>
- [5] Adelman, P. K. and R. B. Zajonc "Facial expression and the experience of emotion." *Annual Review of Psychology*, **40**: pp249-280, 1989.
- [6] M. Kurematsu, J. Hakura, and H. Fujita, "The framework of the speech communication system with emotion processing", *WSEAS, AIKED07*, paper Indexed as; 540-372
- [7] J. Hakura, M. Kurematsu, and H. Fujita, "Facial expression recognition and synthesis toward construction of quasi-personality", *WSEAS, AIKED07*, paper Indexed as; 540-369

Acknowledgments:

This research has done by a grant research support from Iwate Prefectural University. Thanks also to my students who works hardly on collecting data and analyzing the results that contributed in this outcome. Also, deep appreciation for Prof. Tamio Sasaki for his support on Miyazawa Kenji scripts analysis.