感情の文脈的適切性を計算する

# Processing the Contextual Appropriateness of Emotions

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Abstract

This paper presents a method for determining whether emotions expressed by speaker are appropriate for the conversation context. In the method, affect analysis system estimates the speaker's affective states and a Web mining technique gathers from the Internet emotive associations representing a commonsense belief about what emotion should be expressed at the moment. The affect analysis system is supported with Contextual Valence Shifters, which determine the semantic orientation of emotive expressions. The Web mining technique is improved by restricting the search from the whole Web to the contents of blogs as containing strictly evaluative information. Four versions of the method are compared during an experiment with two conversational agents. The support of CVS and blog mining improved the baseline from 45¥% to 60¥%. Implementing this method to a conversational agent can make it choose appropriate conversational procedures, and therefore enhance human-computer interaction.

Affect Analysis
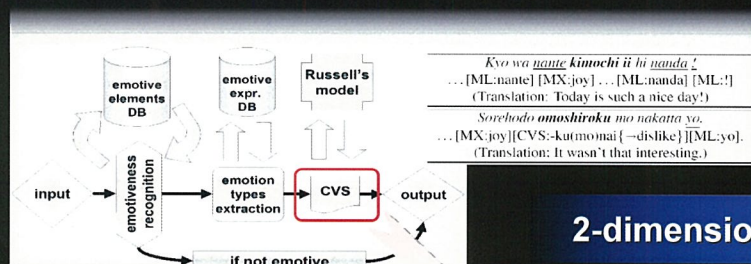
### 2-dimensional Model of Emotions
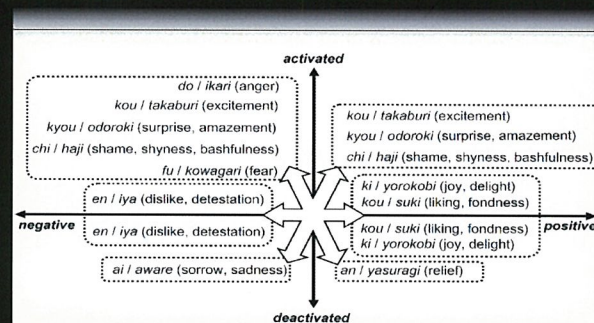
Contextual Valence Shifters

Contextual Valence Shifters (CVS) change semantic polarity of evaluative expressions.
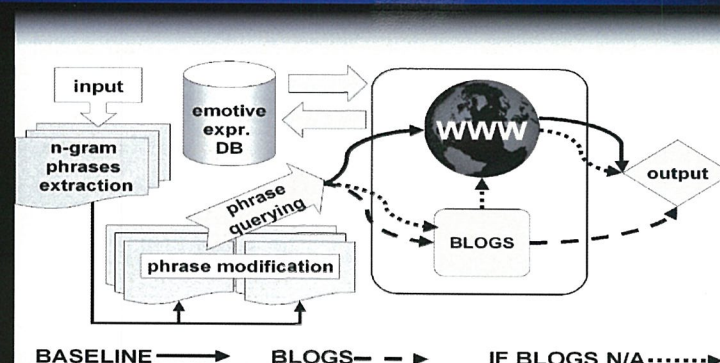
Examples of CVS in Japanese:

Negatons: grammatical structures such as: *amari -nai* (not quite-), *mattaku -nai* (not at all-), or *sukoshi mo -nai* (not even a bit-)

Intensifiers: grammatical structures like: *totemo-* (very much-), *sugoku-* (-a lot), or *kiwamete-* (extremely).

Web Mining
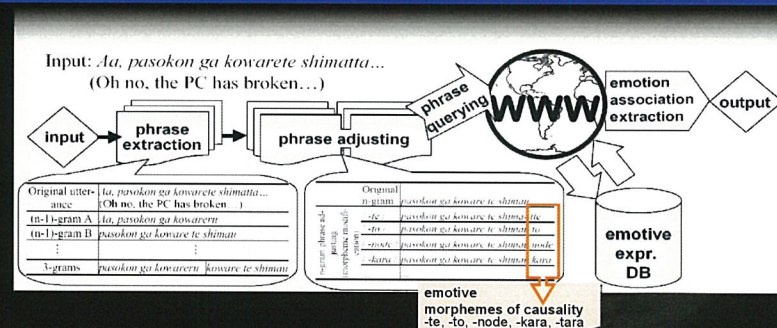
Web Mining of Blog Contents

Contextual Appropriateness of Emotion Verification Procedure

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If ML-Ask = Web-mining then → Emotion Appropriate
If ML-Ask ≠ Web-mining then → Emotion Inappropriate
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Positive-appropriate emotion:
User: I'm so happy I passed the exam!
ML-Ask:joy; Web mining, excitement
Agent: Yeah! That's great! [sympathy]

vs.

Positive-inappropriate emotion:
User: I'd be happy if that bastard died for cancer!
ML-Ask:joy; Web mining:fear, sadness
Agent: Is that what you really feel? [counselling]

Negative-appropriate emotion:
User: I hate him for making a fool of me in front of everyone.
ML-Ask:dislike;
Web mining:anger, dislike
Agent: You have a reason to be angry. [empathy]

vs.

Negative-inappropriate emotion:
User: I won the prize, but I feel so bored.
ML-Ask:dislike, depression;
Web mining:excitement, joy
Agent: You should be happy! [consolation]

| Part of conversation in Japanese (English translation)	ML-Ask output	Web Mining	CAEV
USER: *Kompyuuta wa omoshiroi desu ne.* (Computers are so interesting!)	positive [joy]	positive [joy]	appropriate
SYSTEM: *Sore wa oishii desu ka.* (Is it tasty?) [about instant noodles]	–	–	
USER: *Oishii kedo, ore wa akita kana.* (Its tasty, but I've grown tired of it.)	negative [dislike]	negative [dislike]	appropriate
SYSTEM: *Sore wa omoshiroi tte* (Its so interesting!) [about conversation]	–	–	
USER: *Sore hodo omoshiroku mo nakatta yo.* (It wasn't that interesting.)	negative [dislike]	negative [fear], [sad]	appropriate

Results

TABLE 8. The number of people that agreed with all four system versions in the two agents together for evaluated items C) specified emotion types (upper) and D) valence (lower).

Version of the system	Modalin + Pundalin							
	C) Emotion types				D) Valence			
	Baseline system	With CVS	Blog mining	CVS + Blogs	Baseline system	With CVS	Blog mining	CVS + Blogs
0 people	3	2	2	1	3	2	1	
1-3 people	8	8	7	7	6	6	7	4
4-6 people	6	6	7	7	4	4	4	4
7-10 people	3	4	4	5	7	8	8	8
Summary (10-1 people)	45%	50%	55%	60%	55%	55%	55%	60%

TABLE 10. Statistical significance of the results for different versions of the system.

	Versions of the system			
	Baseline vs CVS	Baseline vs Blogs	CVS vs CVS+Blogs	Baseline vs CVS+Blogs
statistical significance (p value)	0.1599	0.0274	0.0274	0.0119
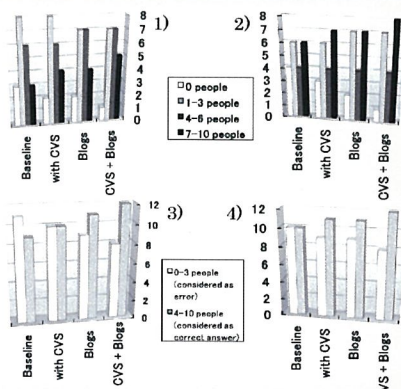
Future Work

- Further improvement of ML-Ask and Web-mining.
- Disambiguation of Emotive Elements
- Creating WordNet Affect for Japanese
- Implement next step of Emotional Intelligence Framework (Understanding Emotions)

References:
- Michal Ptaszynski, Pawel Dybala, Wenhan Shi, Rafal Rzepka and Kenji Araki. "Towards Context Aware Emotional Intelligence in Machines: Computing Contextual Appropriateness of Affective States", In *Proceedings of Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09)*, Pasadena, California, USA, 2009. (to appear)
- Michal Ptaszynski, Pawel Dybala, Wenhan Shi, Rafal Rzepka and Kenji Araki. "Shifting Valence Helps Verify Contextual Appropriateness of Emotions", *The IJCAI-09 Workshop on Automated Reasoning about Context and Ontology Evolution (ARCOE-09)*, in Working Notes of Twenty-first International Joint Conference on Artificial Intelligence (IJCAI-09), Pasadena, California, USA, 2009. (to appear)