

Disentangling Emotions from the Web

Internet in the Service of Affect Analysis

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Presentation Outline

1. Introduction.
2. Affect analysis system of textual input in Japanese.
3. Description of the system.
4. Proposal of supporting the system with Web mining technique to improve the performance of emotional states types extraction.
5. Evaluation.
6. Results.
7. Conclusions and Future work.



Introduction

Computing Intelligence – Computing what?

...Intelligence?

“Ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, to overcome obstacles by taking thought.”

American Psychological Association, 1995

Perloff, R.; Sternberg, R.J.; Urbina, S. (1996). "Intelligence: knowns and unknowns". American Psychologist

“Ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly and learn from experience. (...) Capability for comprehending our surroundings—*"catching on", "making sense" of things, or "figuring out" what to do.*”

Mainstream Science on Intelligence, 1994

Gottfredson, L.S. (1997). "Foreword to "intelligence and social policy"". Intelligence 24 (1): 1–12



Introduction

Intelligence – only one, or one of many?

Howard Gardner – “IQ tells you nothing!”. (Theory of multiple intelligences)
There are at least eight different kinds of intelligence(...and rising): logical, linguistic, spatial, musical, kinesthetic, naturalist, intrapersonal and interpersonal

Gardner, Howard (1993). Frames of mind: The theory of multiple intelligences. New York: Basic Books

Peter Salovey and John D. Mayer – **Emotional Intelligence**

The ability to recognize, monitor one's own and others' emotions, to discriminate among them and to use this information to guide one's thinking and actions.

Salovey, P. & Mayer, J.D. (1990) "Emotional intelligence" Imagination, Cognition, and Personality, 9, 185-211



Definition and classification of emotions

Definition of Emotions

Emotions = every temporary state of mind, feeling or emotional state evoked by experiencing different sensations.

Nakamura, A.: Kanjo hyogen jiten (Dictionary of Emotive Expressions) (in Japanese), Tokyodo Publishing, Tokyo (1993)

Emotive utterances = every utterance in which the speaker in question is emotionally involved, and in which this involvement is linguistically expressed by means of intonation or by the use of performative expressions.

Beijer, F.: The syntax and pragmatics of exclamations and other expressive/emotional utterances. Working Papers in Linguistics 2, The Department of English in Lund. (2002)

Nakamura's classification of emotions (after a thorough study in the Japanese):
10 types:

- | | |
|--|---|
| 1. 喜 <i>ki</i> / <i>yorokobi</i> (<u>joy, delight</u>) | 6. 好 <i>kou</i> / <i>suki</i> (<u>liking, fondness</u>) |
| 2. 怒 <i>do</i> / <i>ikari</i> (<u>anger</u>) | 7. 厭 <i>iya</i> / <i>iyodomi</i> (<u>dislike, detestation</u>) |
| 3. 哀 <i>ai</i> / <i>aware</i> (<u>sorrow, sadness</u>) | 8. 昂 <i>kou</i> / <i>takaburi</i> (<u>excitement</u>) |
| 4. 怖 <i>fu</i> / <i>kowagari</i> (<u>fear</u>) | 9. 安 <i>an</i> / <i>yasuki</i> (<u>relief</u>) |
| 5. 恥 <i>chi</i> / <i>haji</i> (<u>shame, shyness, bashfulness</u>) | 10. 驚 <i>kyou</i> / <i>odoroki</i> (<u>surprise, amazement</u>) |

Our approach

Step 1. Recognition of emotions:

- Voice
- Facial expressions
- Gestures
- **Language**

	textual data	voice and visual data
gathering	easy	laborious
available data	many corpora plus Web	only prepared for the particular research
processing	fast	slow and heavy
semantics	OK.!	NO!

Our approach

In language there are:

1. Emotive expressions. Parts of speech, that in emotive sentences describe emotional states.

A. Nakamura, *Kanjō hyōgen jiten* (Dictionary of Emotive Expressions), Tokyodo Publishing, Tokyo (1993)

2. Emotive elements. Indicating that emotions have been conveyed, but not detailing what specific emotions there are. The same emotive element can express different emotions depending on context.

M. Ptasiński, *Moeru gengo - Intānetto kei-jiban no ue no nihongo kaiwa ni okeru kanjōhyōgen no kōzō to kigōrontekikinō no bunseki* – "2channeru, denshikeijiban o rei toshite – (Boisterous language. Analysis of structures and semiotic functions of emotive expressions in conversation on Japanese Internet bulletin board forum - 2channel -), UAM, Poznań (2006)



Emotive Elements / Expressions Analysis System (ML-Ask)

emotive
expr.
DB

emotive
elements
DB

nouns

愛情 *aijou* (love)
安心 *anshin* (relief)
恐怖 *kyofu* (fear)

verbs

喜ぶ *yorokobu* (be glad)
悲しむ *kanashimu* (feel sad)
むかつく *mukatsuku* (get angry)

phrases / idioms

虫酸が走る *mushizu ga hashiru* (give one the creeps)
心が解ける *kokoro ga tokeru* (one's heart is melting in relief)
歓天喜地 *kantenkichi* (delight larger than Haven and Earth)

adjectives

嬉しい *ureshii* (happy)
悔しい *kuyashii* (mortifying)
怖い *kowai* (scary)

exclamatives

すげえ *sugee* (great!)
うおお *wooo* (whoa!)

mimetics (*gitaigo*)

ワクワク *wakuwaku* (heart pounding)
ドキドキ *dokidoki* (go pit-a-pat)

vulgarities

ーやがる *-yagaru* (fu**ing do sth)
くそ *kuso* (shit)
馬鹿 *baka* (stupid)

hypocorystics

ーちゃん *-chan* (name suffix)

textual representations of voice modulation and body language (emoticons)

“!” , “??” , “...” , (T_T) , (-_-;) , _|_|_O

An example of analysis

この本さー、すげー やばかった よ。まじ怖すぎ。
Kono hon saa, sugee yabakatta yo. Maji kowa sugi.
That book, ya know, it was a killer. It was just too scary.

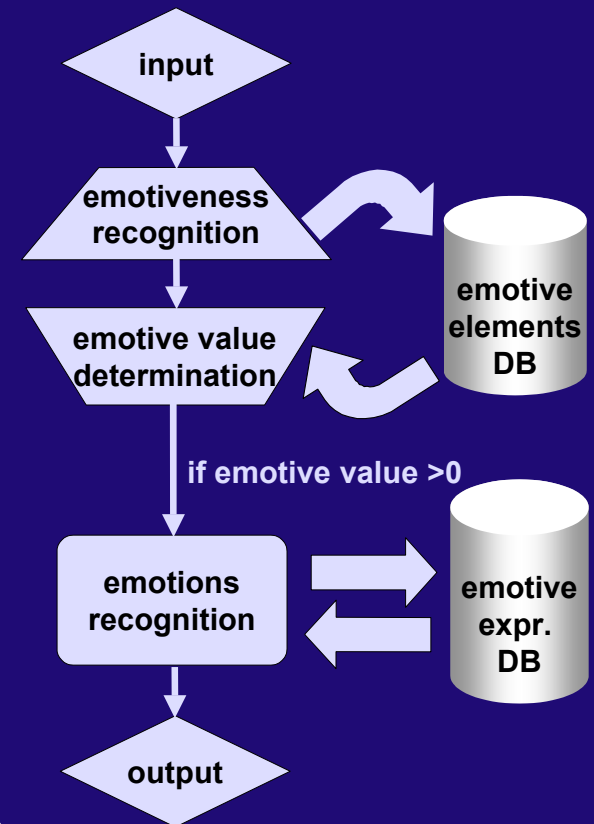
emotive elements:

さー, すげー, やばい, -よ, まじ

emotive value = 5

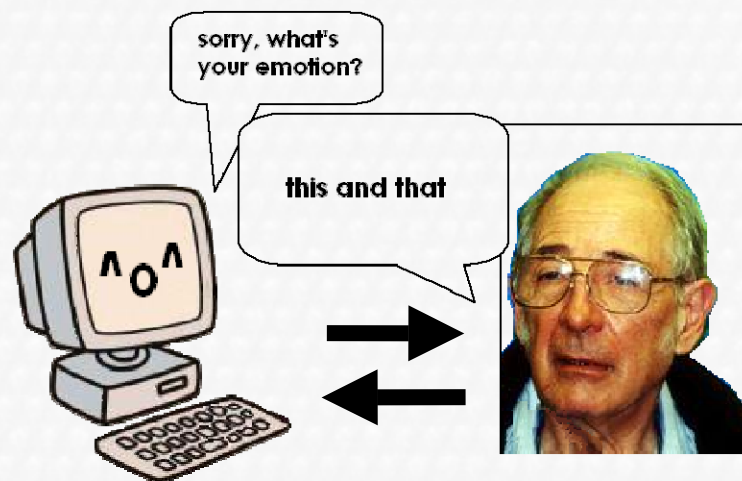
emotive expressions:
怖い

System Flowchart



Preliminary Evaluation

- Collection of utterances (90) is tagged by authors of the utterances in the same way, as the system's procedure – they determine:
 - 1) whether an utterance is emotive
 - 2) in emotive utterances, describe the specific emotion types.
- Second tagging – by a third party evaluators – to set a general human level in recognizing emotions by humans
- Results of ML-Ask are compared to the sentence authors.



Preliminary Evaluation

Emotive / Non-emotive.

ML-Ask determines the emotiveness on a very high **human level.**

Emotion types.

ML-Ask recognizes the emotion types on **65% of the human level.**



Enhancing ML-Ask

Goal: Improving the recognition of the emotion types

Application: Shi's Web mining technique for extracting emotive associations from the Web.*

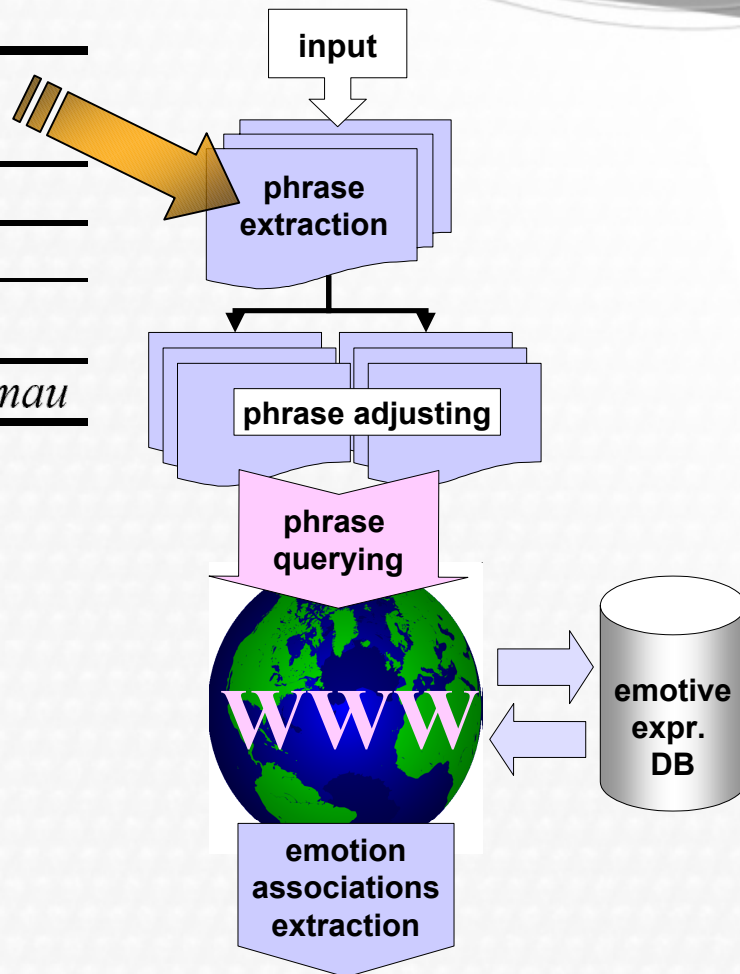
Shi, W.: Discovering Emotive Content in Utterances Using Web-mining (in Japanese). Hokkaido University (2008)

- * A) ML-Ask with Shi's technique combined;
- B) ML-Ask with Shi's technique instead of the usual emotion extraction method;

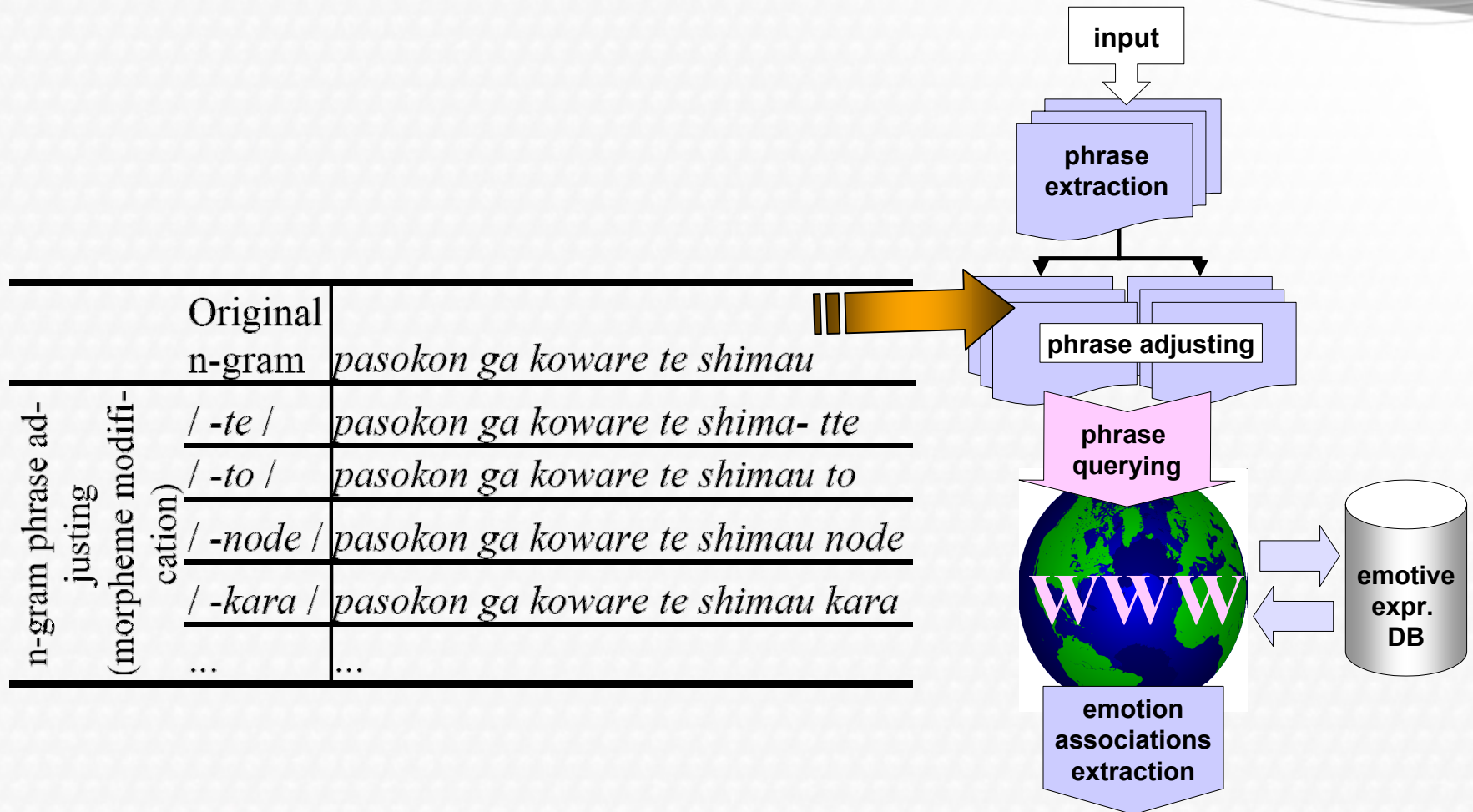


Web Mining Technique

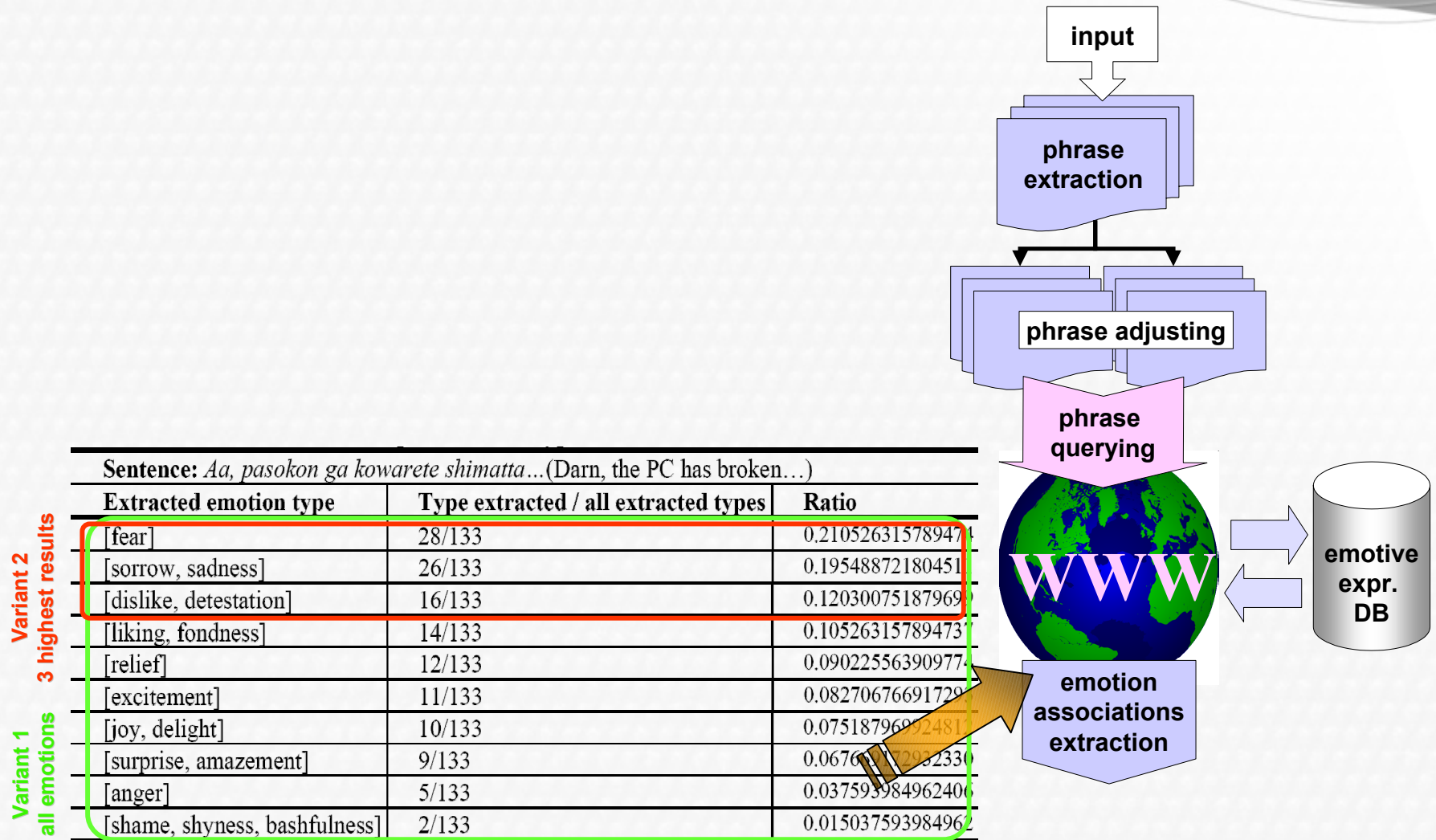
Original utter- ance	<i>Aa, pasokon ga kowarete shimatta...</i> (Darn, the PC has broken...)	
(n-1)-gram A	<i>Aa, pasokon ga kowareru</i>	
(n-1)-gram B	<i>pasokon ga koware te shimau</i>	
⋮	⋮	
3-grams	<i>pasokon ga kowareru</i>	<i>koware te shimau</i>



Web Mining Technique



Web Mining Technique

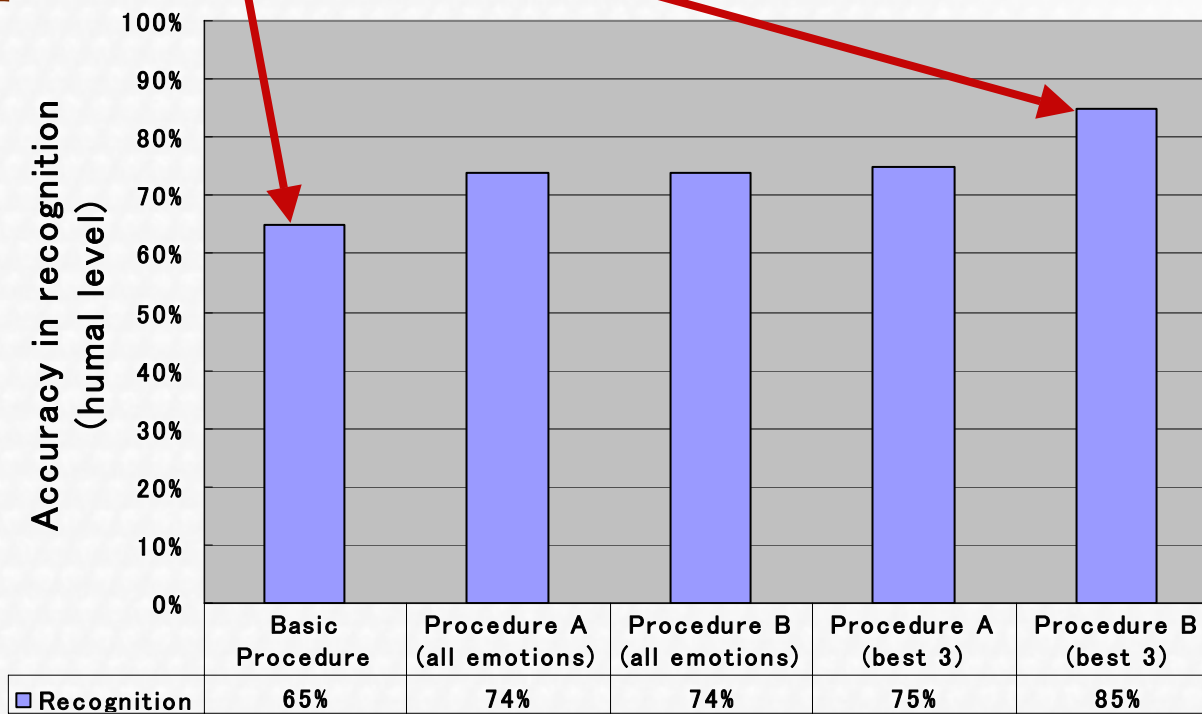


Results



Emotion types.

ML-Ask's performance was enhanced from **65% to even 85% of the human level.**



Conclusions

-  In every case the Web mining improved emotion types determination.
-  It was more effective to keep only 3 highest results of the emotion types extracted from the Web.
-  The system could be useful in such fields as:
 - AI: (Re)creating “The Emotion Machine”
 - Determining of a choice action patterns for conversational agents
 - Cultural studies: Creating multi-language global version of the system (How people in different cultures express emotions through language)
 - Education: Teaching foreigners natural (Japanese) language
 - Everyday: Helping us understand our own emotions (one of the most important cognitive behaviors)

Future Work

➤ Still needed:

- More accurate phrase extraction from an utterance
- Larger, deeper evaluation

➤ Russell's two-dimensional model of emotions is likely to help in determination of emotion types.

➤ Applying a Web page indexing (like HyperEstreier, etc.) should speed up the Web mining process (now a few minutes to even a dozen or so) and make the system applicable to real time affect analysis.

➤ Final application → conversational agent (choosing the type of action depending on user's emotion)

Russell, J. A.: A circumplex model of affect. Journal of Personality and Social Psychology, 39, pp. 1161--1178 (1980)



Thank you for your kind attention!

