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Development of Emoticon Database for Affect Analysis in Japanese

ABSTRACT

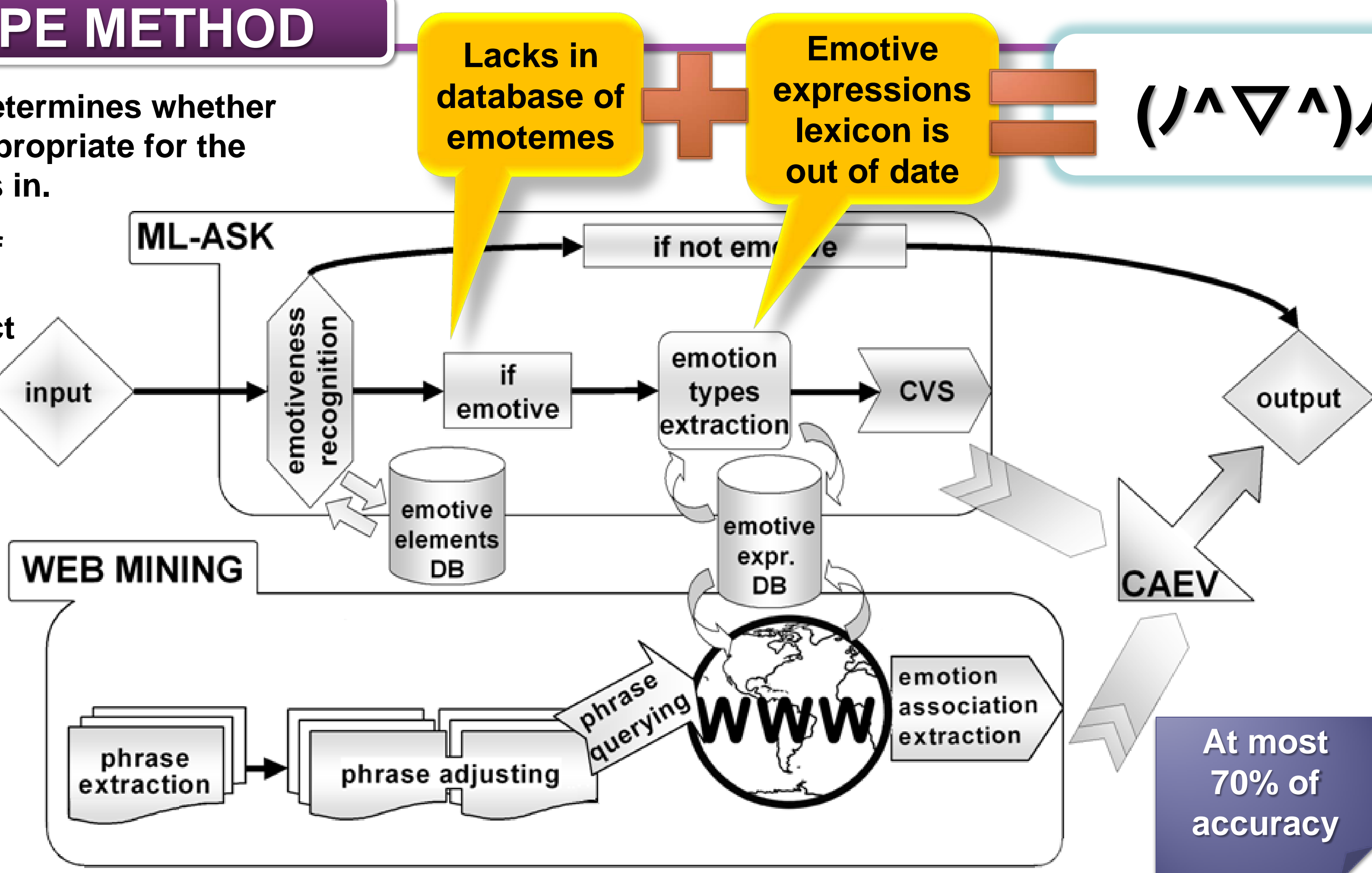
We present our work on creating a database of emoticons – face marks widely used to convey emotions in text-based online communication. The database is created by gathering emoticons from numerous dictionaries of face marks and online jargon. The inconsistencies in emotion classification provided by various dictionaries are solved by processing them with an affect analysis system developed previously. Having the emoticon database annotated automatically this way, we extract patterns from it patterns of semantic areas of emoticons, such as "eyes" and "mouths". Finally, we perform annotation of the semantic areas based on co-occurrence statistics and the theory of kinesics.

PROTOTYPE METHOD

The method [1] determines whether the emotion is appropriate for the context it appears in.

For recognition of emotions it uses Ptaszynski's affect analysis and annotation system, ML-Ask [2],

To verify the contextual appropriateness of those states it uses Shi's Web mining technique [3] for gathering emotive common sense from the Internet.



I. DEFINITION OF EMOTICON

Emoticon - one-line string of symbols containing at least one set of semantic areas: "mouth" [M], "eyes" [E_L], [E_R], "emoticon borders" [B₁], [B₂], and "additional areas" [S₁] - [S₄]. Minimal emoticon set considered contains: "E_LE_R", "E_LM", "M,E_R", "S₁/S₂E_L/M" or "M/E_RS₃/S₄".

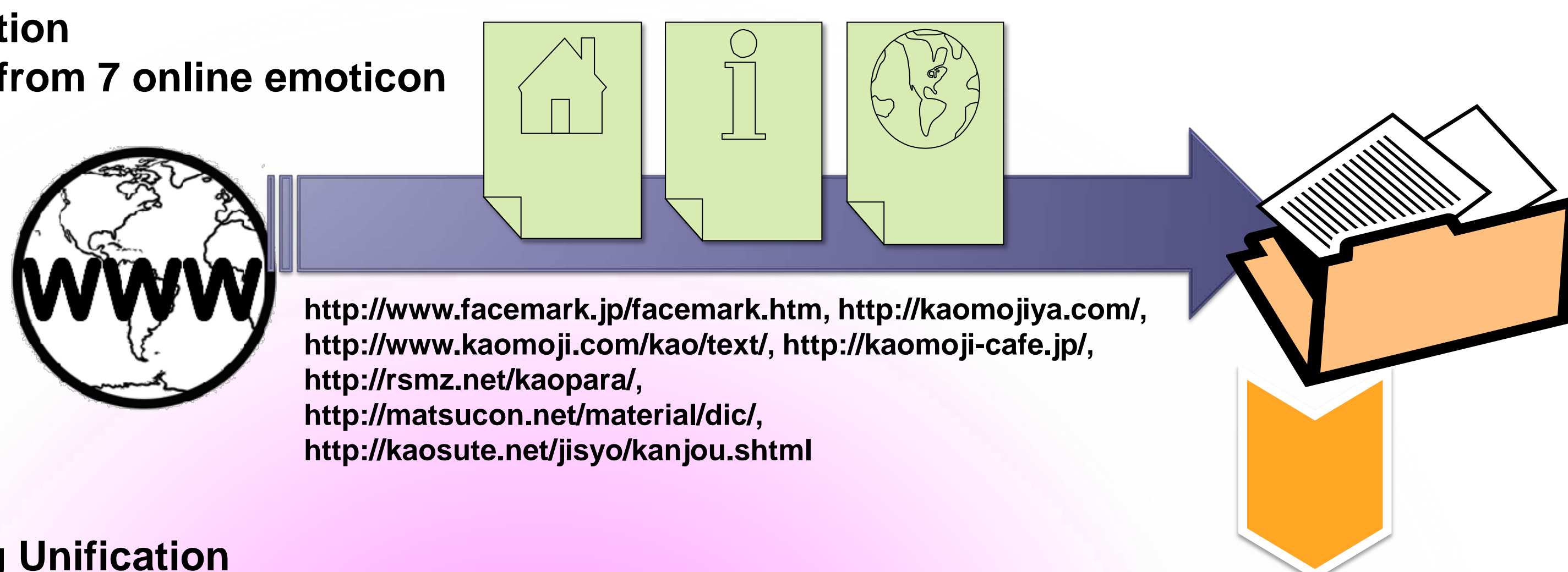
No. of sets	Emoticon	S ₁	B ₁	S ₂	E _L	M	E _R	S ₃	B ₂	S ₄	...
1	∇ (∙ ω ∙) /	∇	(∙	∙	ω	∙	N/A)	/	
1	(— ∙ ;)	N/A	(N/A	—	N/A	∙	;)	N/A	
<div style="display: flex; justify-content: space-around;"> <div> <p>SET 01</p> <p>2 (^ ^) ^ (^ ^)</p> <p>2 ☆ - (● ∇ ∙) ^ (∇ ∇ ∙) - ☆</p> </div> <div> <p>SET 02</p> <p>2 (^ ^) ^ (^ ^)</p> <p>2 (∇ ∇ ∙) ^ (∇ ∇ ∙) - ☆</p> </div> </div>											
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III. DATABASE OF EMOTICONS

1. Resource Collection

Extract emoticons from 7 online emoticon dictionaries:

Face-mark Party,
Kaomojiya,
Kaomoji-toshokan,
Kaomoji-café,
Kaomoji Paradise,
Kaomojisyo
Kaomoji Station



2 Database Naming Unification

- The number of categories and nomenclature in the dictionaries was not unified.
- Processed all category names with ML-Ask [2] according to coherent classification of emotions based on Nakamura [4].
- Extracted 11,416 emoticons (10,137 unique ones, 89%).
- Group by emotion type

3 Extraction of Semantic Areas appearing in unique emoticons.

4 Annotation of Semantic Areas

- Occurrence frequency of the area in the emotion type database was calculated for every triplet, eye pair and mouth.
- Automatic annotation according to the probability of emotion expression (occurrence frequency).

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Input: ∙ ∙ ( / ∇ ∙ ; ) ∙ ∙
Find match in raw emoticon database: ∙ ∙ ( / ∇ ∙ ; ) ∙ ∙
If no match, localize ELER triplet in the ELER triplet
database: / ∇ ∙
If no triplet found, look for any ELER combination;
If no combination matched, find any ELER or M from separate
semantic area database: / ∙ ∙ ∙ ∙
Localize emoticon borders B1,B2 : ( , )
Localize additional areas S1,S2,S3,S4 : ∙ ∙ ∙ ∙ ∙ ∙
Determine the emoticon structure: S1: ∙ ∙, B1:(, S2:N/A, ELER:
/ ∙, M: ∇, S3;;, B2:), S4: ∙ ∙
Look for next emoticon;
    
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II. THEORY OF KINESICS

Kinesics - refers to all non-verbal behavior related to movement, such as postures, gestures and facial expressions (synonym of "body language"). Created by Birdwhistell in 1952-1970 [5, 6].

-Non-verbal behavior is used in everyday communication systematically and can be studied similarly to language.
-A minimal part distinguished in kinesics is a *kineme* - the smallest set of body moves containing a certain meaning, e.g. raising eyebrows, annotated by *kinegraphs*.

— ○ —	Blank-faced	⚡ ⚡	Slitted eyes
— ∩ —	Single raised brow (∩ indicates brow raised)	⦿ ⦿	Eyes upward
— ∪ —	Lowered brow	◐ ◐	Shifty eyes
∨	Medial brow contraction	⦿ ⦿	Glare
∇ ∇	Medial brow nods	☺	Tongue in cheek
∩ ∩	Raised brows	☺	Pout
○ ○	Wide eyed	☺	Clenched teeth
— ○	Wink	☺	Toothy smile
◐ ◐	Sidewise look	☺	Square smile
◑ ◑	Focus on auditor	☺	Open mouth
◑ ◑	Stare	☺	Slow lick—lips
◑ ◑	Rollled eyes	☺	Quick lick—lips
		☺	Moistening lips
		☺	Lip biting

Emoticons: representations of body language in online text-based communication. → We can base the analysis of emotive information conveyed in emoticons on annotations of the particular semantic areas (kinemes) grouped in an automatically constructed emoticon database.

IV. DATABASE STATISTICS

Table 1. Distribution of all types of unique areas for which occurrence statistics was calculated across all emotion types in the database.

areas	E _L ME _R	S ₁	B ₁	S ₂	E _L E _R	M	S ₃	B ₂	S ₄
joy, delight	1298	1469	—	653	349	336	671	—	2449
anger	741	525	—	321	188	239	330	—	1014
sadness,	702	350	—	303	291	170	358	—	730
fear	124	72	—	67	52	62	74	—	133
shame, shyness	315	169	—	121	110	85	123	—	343
liking, fondness	1079	1092	—	802	305	239	805	—	1633
dislike	527	337	—	209	161	179	201	—	562
excitement	670	700	—	268	243	164	324	—	1049
relief	81	50	—	11	38	26	27	—	64
surprise, amazement	648	405	—	231	183	154	279	—	860
overall	6185	5169	—	2986	1920	1654	3192	—	8837

Database Coverage

Unique raw emoticons = 10,137

Unique E_LME_R triplets = 6,185

unique pairs of eyes E_LE_R = 1,920

Unique mouths M = 1,654

All possible combinations of triplets E_LE_R × M = 3,175,680 possibilities

Unique raw emoticons (10,137) = 0.3% of full coverage

Unique triplets (6,185) = 0.2% of full coverage.

Without our approach (kinesics) we loose 97% of possible coverage!

CONCLUSIONS

We presented a description of a database of emoticons to be used in further research on affect analysis. The database contains over ten thousand of unique emoticons collected from the Internet. These emoticons are automatically distributed into emotion classes. The emoticons are divided into semantic areas (mouths or eyes). The division into semantic areas is based on Birdwhistell's [5,6] theory of kinesics. The database will be used in emoticon analysis system. The database contains over ten thousand of raw emoticons and over 3 million of possible combinations covering most of the possibilities. Planned evaluation: 1) emoticon detection in a sentence; 2) emoticon extraction from a sentence; 3) division of emoticon into semantic areas; 4) emotion classification of emoticons.

REFERENCES

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6.R. L. Birdwhistell, Kinesics and Context. University of Pennsylvania Press, Philadelphia, 1970.