

Towards Emotive Annotation in plWordNet 4.0

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Agenda

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- 2 pIWordNet as a Basis
- 3 Annotation Model
 - Main Assumptions
 - Scheme
- 4 Annotation Procedure
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Context and Goal

- Motivation
 - plWordNet achieved good coverage
 - many users declared sentiment analysis, as their intended use
 - a successful pilot project on emotive annotation of a selected subset of senses ($\approx 31k$)
- Goals
 - to develop an improved and expanded model of emotive annotation for a wordnet, and also an expanded version of the manual annotation procedures
 - substantial extension of the emotive annotation of plWordNet

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plWordNet 3.1 emo

Very Large Wordnet for Polish

- A very large lexical semantic network for Polish
 - built manually by corpus-based wordnet development method on the basis of 4G words corpus of Polish (since 2005, more than 50 person-years of workload)
 - the largest wordnet in the world and the largest Polish dictionary ever built
- Lexical units (lemmas plus senses) as basic building blocks
- plWordNet in numbers (*version 3.1 in preparation*):

Elements	Verbs	Nouns	Adv.	Adj.	All
Lemmas	19 601	133 785	8 006	29 254	190 646
Lexical Units	38 641	17 6787	14 035	54 044	283 507
Synsets	27 773	132 403	11 256	46 722	218 154



plWordNet 3.1 emo

Selected Features

- More than 40 types of lexico-semantic relations, and more than 100 subtypes
- $\approx 700\ 000$ relation links (between synsets and lexical units)
- Manual bi-directional mapping onto Princeton WordNet 3.1 (PL-EN: $\approx 211\ 000$ & EN-PL: $\approx 38\ 000$)
- enWordNet 1.0 ($\approx 10\ 000$ LUs) – a manually built extension to WordNet 3.1
- Manual mapping onto Wikipedia ($\approx 60\ 000$ links)
- Glosses ($\approx 160\ 000$) and usage examples ($\approx 68\ 000$) for lexical units
- Semi-automated mapping onto SUMO ontology
- Completely open license



Annotation Model

Main Assumptions

- Lexical units are a natural place for sentiment and emotion annotation
- Emotive annotation is focused on those emotive properties of LUs that are revealed in situation in which the given LU is maximally detached from the interpretation context
- Comparing its authentic uses found in the text corpora
- Search for polarisation stability that should be repeated in the collocations of the given LU
- Emotive characteristics that is common to the analysed expressions and salient to the recipient, i.e. an annotator



Annotation Model

Scheme

Sentiment polarity strong negative, weak negative, neutral, weak positive, strong positive plus *ambiguous*

Basic emotions (Plutchik, 1980) joy, trust, fear, surprise, sadness, disgust, anger, anticipation

Fundamental human values (Puzynina, 1992)

- *positive: użyteczność* 'utility', *dobro drugiego człowieka* 'another's good', *prawda* 'truth', *wiedza* 'knowledge', *piękno* 'beauty', *szczęście* 'happiness'
- *negative: nieużyteczność* 'futility', *krzywda* 'harm', *niewiedza* 'ignorance', *błąd* 'error', *brzydota* 'ugliness', *nieszczęście* 'misfortune'

Usage examples at least one for each polarity



Annotation Model

Annotation Examples

dziad 1 gloss: “stary mężczyzna” ‘an old man’

⟨ Annot.:A1, BE: {*złość* ‘anger’, *wstręt* ‘disgust’},

FHV:{*nieużyteczność* ‘futility’, *niewiedza* ‘ignorance’}, SP:—s

Exam: “Stary dziad nie powinien podrywać młodych dziewczyn.”

‘An old geezer should not pick up young girls.’ ⟩

⟨ Annot.:A2, BE: {*wstręt* ‘disgust’}, FHV:{*nieużyteczność*

‘futility’, *brzydota* ‘ugliness’}, SP:—w

Exam: “Jakiś dziad się dosiadł do naszego przedziału i wyciągnął

śmierdzące kanapki z jajkiem.” ‘An old geezer joined our

compartment and took out stinky egg sandwiches.’ ⟩

⟨ Annot.:A3, BE: {*wstręt* ‘disgust’}, FHV:{*nieużyteczność*

‘futility’, *brzydota* ‘ugliness’}, SP:—s

Exam: “Kilkanaście lat minęło i zrobił się z niego stary dziad.”

‘Several years have passed and he has become an old geezer’ ⟩



Annotation Model

Annotation Examples

wytrzymały 2 'enduring'

⟨Annot.:A1, BE:{*zaufanie* 'trust'}, FHV:{*użyteczność* 'utility'},

SP:+w,

Exam: "Wykonaliśmy podłogę z wytrzymałych paneli, dzięki temu od lat prezentuje się wspaniale."

'We made the floor from enduring panels, that is why it has been looking splendid for years' ⟩

⟨Annot.:A2: BE:{*zaufanie* 'trust'}, FHV:{*użyteczność* 'utility'},

SP:+w

Exam: "Postanowiłem nie oszczędzać i kupić plecak z wytrzymałego materiału — przynajmniej wiem, że nie rozleci mi się po roku." 'I decided to not economize and to buy a backpack made of enduring material — at least I know that it will not tear apart after one year.' ⟩



Annotation Procedure

Main Assumption

- Annotators: linguists and psychologists, where each LUs is annotated by a mixed pair: one psychologist and one linguist
- Guidelines:
 - a core common to all PoSs
 - detailed guidelines dedicated to each PoS;
 - based on linguistic tests and consulting language data in corpora
- Independent work: annotators do not see their decisions, people are exchanged in pairs
- Super-annotator: solve disagreements, verifies, and evaluates



Annotation Procedure

Core Procedure

- Step 1** identification of LUs with *neutral* and *non-neutral* sentiment polarity;
- Step 2** assignment of the basic emotions and fundamental human values;
- Step 3** recognition of the LU polarity direction: negative or positive, but also *ambiguous*, if the collected use examples show both behaviours;
- Step 4** assignment of sentiment polarity intensity;
- Step 5** illustration of the assigned annotation by sentences representing use examples: at least one sentence in the case of positive and negative LUs, and at least two example sentences for ambiguous LUs.



Annotation Procedure

Markedness Test for Nouns – Procedure 1

- *implicit*
 - e.g., names of emotional states – can be recognised without referring to context
- *explicit*
 - motivated by form or meaning
 - co-occurrence in corpus with (Markowski, 1992):
 - deictic and possessive pronouns and operators which specify markedness, for example:
 - **pomyśl o ...* 'please think of ...' *starociu* 'a relic'
 - pomyśl o ...* 'please think of ...' *tym naszym starociu* 'this relic of ours'
 - concreteness test (Markowski, 1992)
 - modification by the pronouns *ten* 'this, the', *taki* 'such, such as', *twój* 'your_{possessive}' and *jakiś* 'some, a_{referential}, one'



Annotation Procedure

Markedness Test for Nouns – Procedure 2

- the presence of pragmatic elements in the wordnet glosses for the analysed lexical units and in their definitions in various dictionaries
- the presence of qualifiers for genres in the wordnet glosses of the analysed lexical units .

Result: *neutral* versus *marked*



Annotation Procedure

Sentiment polarity (1)

- 1 Congruence test
 - 2 Discord test
 - 3 Test of collocations
 - 4 Test of dictionary definitions
- *Congruence test*
 - all occurrences of the given lexical unit X (not a lemma/word) in the usage examples to have the same sentiment polarity as that considered for X
 - co-occurring adjectives, nouns and verbs do not change the polarity value, but support it
 - diverse examples for the *ambiguous* value



Annotation Procedure

Sentiment polarity (2)

- Discord test
 - the presence of a proper antonymy link between the lexical unit considered and some other lexical units with clear sentiment polarity
 - e.g., *nadzieja* 'hope' [positive] – *rozczarowanie* 'disappointment'
- Test of collocations
 - words included in collocations for the given lexical units are examined with respect to their sentiment polarity
 - the strength of the observed tendency



Annotation Procedure

Sentiment polarity (3)

- Test of dictionary definitions
 - checking if all components of the definition (definition parts) are clearly positive, negative or mixed
 - e.g., *positive*
szatan 'devil' – *z podziwem o człowieku bardzo zdolnym, sprytnym, odważnym*
'admiringly about someone very capable, canny, courageous'
[plWordNet gloss]
 - e.g., *negative*
bubek 'a kind of ass and upstart' – *z niechęcią o mężczyźnie mało wartym, ale mającym wygórowane mniemanie o sobie*
'with dislike about a man worth little but with an excessively high opinion of himself'
- Test for distinguishing diminutive formant function
 - based on three groups of adjuncts



Annotation Procedure

Sentiment strength

- 1 Distance on an intensity scale between a given lexical unit and basic emotions assigned to it
 - e.g., {*niezadowolenie* 'dissatisfaction'} vs {*smutek* 'saddness' and *złość* 'pique'} → full description → strong
- 2 Comparison of a given lexical unit with another one with a similar meaning.
- 3 If the given lexical unit seems to have negative polarity but it is used to characterise a child humorously, we assign it weak polarity
- 4 Time drift: the contemporary state and the contemporary polarity of lexical units is described



Annotation Procedure

Usage Examples

- Double role
 - illustration: the annotations and the related aspects of the lexical unit's meaning, and they
 - verification: the earlier decisions
- Selected or created
- Focused on
 - frequent collocations of the LU under consideration
 - unofficial situations that are not frequent in dictionaries



Annotation Procedure

Tests for Adjectives

- Problem of fine-grained meanings: collocations as a tool for prompting a particular meaning
- **Markedness (neutrality) test**
 - exploration of the wordnet structure of derivational relations for adjectives
 - non-derived adjectives analysed by test analogical to those for nouns
- **Assignment of emotions and values**
 - test related to classes of adjectives based on derivation
- **Polarity recognition**
 - a *congruence test*, a *discord test*, a *test of collocation* and a *test of dictionary definitions*
 - in a similar way to nouns

Intermediate Results

PoS	# Comp	# Sing	-s	-w	n	+w	+s	amb
N	32,374	12,710	12.00	11.32	63.32	5.00	3.09	5.27
Adj	20,386	2,523	16.09	29.59	15.78	19.12	8.31	11.11
All	52,760	15,233	13.37	17.48	47.30	9.76	4.84	7.24

- Comp – completed, Sing – one annotator only so far;
- -s, -w, n, +w, +s, amb (negative strong/weak, neutral, positive weak/strong, ambiguous) are shown in percentage points.



Intermediate Results

Inter-annotator Agreement (Sep. 2017)

PoS	All	-s	-w	n	+w	+s	amb
All	0.78	0.77	0.78	0.82	0.74	0.73	0.65
Mrk.	0.84	0.80	0.84	-	0.89	0.80	0.86

- Inter-annotator agreement (IAA), measured in Cohen's' κ ,
- for different sentiment polarities: -s, -w, n, +w, +s, amb (negative/positive vs strong/weak, neutral, ambiguous)
- *All* describes agreement for all decisions,
- *Mrk* – estimated IAA for non-neutral LUs only.



Intermediate Results

Basic emotions & human fundamental values

PoS	joy	trust	antic.	surprise	fear	disgust	sadness	anger
N	15.17	6.74	0.96	0.65	7.66	21.78	16.77	30.27
Adj	20.95	8.01	0.54	0.37	5.31	18.56	21.56	24.71
	util.	good	truth	know.	beauty	happ.	futility	harm
N	18.89	3.06	0.76	4.76	2.17	14.98	13.93	12.69
Adj	23.88	3.62	1.01	2.53	4.03	14.37	15.29	8.85
	ignor.	error	uglin.	misfor.	-	-	-	-
N	3.07	13.40	2.71	9.58	-	-	-	-
Adj	1.18	14.30	3.56	7.40	-	-	-	-

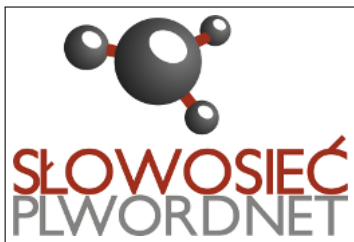


Conclusions and Further Works

- pIWordNet 4.0 emo will be completed and published on open licence by June 2018
 - intermediate version (now $\approx 70k$) is available as a part of pIWordNet 3.1 emo
- The target size is more than 130k LUs with manual emotive annotation from all PoS.
- The linguistic method of manual annotation expresses high Inter-annotator Agreement
- Next, the annotation is automatically spread to the rest of pIWordNet
- We plan also to compare our annotation with annotation built for English using the mapping of pIWordNet onto Princeton WordNet.



Thank you very much for your attention!



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