

Metaphor as a Medium for Emotion

Jonas Bertgen

Figurative Language Resolution
Prof. Dr. Katja Markert

Outline

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- 2 *Metaphor as a Medium for Emotion: An Empirical Study*

Literal, Metaphorical or Both? Detecting Metaphoricity in Isolated Adjective-Noun Phrases

Literal, Metaphorical or Both?

- by Agnieszka Mykowiecka, Małgorzata Marciniak, Aleksander Wawer
- adding beside metaphorical and literal a third categories for metaphors fitting in both categories depending on context
- only on adjective-noun phrases
- embedding based approach
- comparing different neural architectures
- data in Polish and English

- uses a collection of 2 380 adjective-noun phrases with 259 different adjectives
- adjectives assigned to 55 classes (e.g. physical feature, dimension, color, material, luminosity, ...)
- nouns assigned to two classes abstract and concrete, not following WordNet typology
- for English binary classification on Tsvetkov et al. 2014 and Gutierrez et al. 2016

Embeddings

- used distributional semantic model created by Word2Vec from the gensim package
- models based on lemmas
- Continuous Bag of Words (CBOW) architecture
- models were prepared on the basis of NKJP (general corpus of Polish) and a dump of Polish Wikipedia from 2016
- two models used (300 and 100 dimensions)
- one consisted of all data, while the second was limited to words occurring no fewer than 50 times for NKJP data or no fewer than 30 times for Wikipedia data
- for English 300 element pretrained GLoVe-vectors trained on Wikipedia 2014 and Gigaword

NN-Structure

- dense neural architecture and sequential one(LSTM)
- dense with 2 and 3 layers
- for Polish data classification with 2(literal and metaphorical) and 3 classes (+ both)
- for English only classification with 2 classes

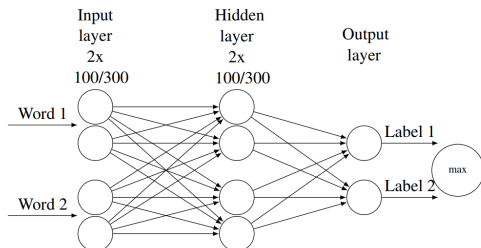


Figure 1: Net architecture for L and M phrases classification

Results Polish

2 dense layers, vec. size 100						
	nb	ep.	P	R	F1	acc.
M	1030	10	0.88	0.88	0.88	
		20	0.89	0.87	0.88	
L	1017	10	0.88	0.88	0.88	
		20	0.87	0.89	0.88	
avg.	2047	10	0.88	0.88	0.88	0.879
		20	0.88	0.88	0.88	0.878

3 dense layers, vec. size 100						
	nb	ep.	P	R	F1	acc.
M	1030	10	0.89	0.86	0.87	
		20	0.90	0.87	0.88	
L	1017	10	0.86	0.89	0.88	
		20	0.87	0.90	0.89	
avg.	2047	10	0.88	0.88	0.88	0.876
		20	0.88	0.88	0.88	0.884

Table 2: Input: only embeddings, vectors 100

2 dense layers, vec. size 100						
	nb	ep.	P	R	F1	acc.
M	1030	10	0.90	0.87	0.88	
		20	0.89	0.87	0.88	
L	1017	10	0.87	0.91	0.89	
		20	0.87	0.89	0.88	
avg.	2047	10	0.89	0.89	0.89	0.886
		20	0.88	0.88	0.88	0.880

3 dense layers, vec. size 100						
	nb	ep.	P	R	F1	acc.
M	1030	10	0.88	0.87	0.88	
		20	0.90	0.87	0.88	
L	1017	10	0.87	0.88	0.88	
		20	0.87	0.90	0.89	
avg.	2047	10	0.88	0.88	0.88	0.876
		20	0.89	0.89	0.89	0.886

Table 5: Input: word embeddings, adjective domain, type of noun (abstract/concrete)

Result Tsvetkov et al.

	nb	P	R	F1	acc.
Dense, 20 epochs, 10-times cross validation					
M	882	0.87	0.86	0.86	
L	871	0.86	0.87	0.86	
avg.	1753	0.86	0.86	0.86	0.864
LSTM, 20 epochs, 10-times cross validation					
M	882	0.86	0.86	0.85	
L	871	0.86	0.85	0.85	
avg.	0.86	0.86	0.86	0.855	
Dense, 20 epochs, test data					
M	100	0.90	0.72	0.80	
L	100	0.77	0.92	0.84	
avg.	200	0.83	0.82	0.82	0.819
GRU, 2 hidden layers, 20 epochs, test data					
M	100	0.90	0.78	0.83	
L	100	0.81	0.91	0.85	
avg.	200	0.85	0.84	0.84	0.845
LSTM, 2 hidden layers, 20 epochs, test data					
M	100	0.90	0.76	0.83	
L	100	0.79	0.92	0.85	
avg.	200	0.85	0.84	0.84	0.84

Table 9: Our results for Tsvetkov et al. (2014) data

Conclusion

- simplest NN archive almost same results as more sophisticated
- results by Tsvetkov et al. little higher than in this paper
- results on Gutierrez et al. replicated
- adjective domain and the information on noun concreteness no significant influence
- classification with 3 classes has worse results (-0.11)

Metaphor as a Medium for Emotion: An Empirical Study

Metaphor as a Medium for Emotion: An Empirical Study

- by Saif M. Mohammad, Ekaterina Shutova, Peter D. Turney
- Published in SEM* 2016
- claims to be the *first data-driven study comparing the emotionality of metaphorical expressions with that of their literal counterparts*
- following the source target approach by Lakoff and Johnson 1980
 - a. The new measures *are strangling* business.
 - b. The new measures tightly regulate business.

The 2 Hypothesis

Hypothesis1 :

Metaphorical uses of words tend to convey more emotion than their literal paraphrases in the same context.

Hypothesis2 :

The metaphorical sense of a word tends to carry more emotion than the literal sense of the same word.

- WordNet as Data Base
- only verbs, since this is the most frequent type of metaphor (Camerson 2003, Shutova and Teufel 2010)
- only verbs with at least three senses so there is the chance of at least one metaphorical sense
- only verbs with less than ten senses to avoid highly ambiguous verbs
- 1 639 senses of 440 verbs used (limitation via Questionnaire)
- from this words the example sentences were used, if they contained the focus word

Questionnaire 1: Literal or Metaphorical?

- Is the focus word used in a literal sense or a metaphorical sense in that sentence?
- literal defined as: *more basic, straightforward meaning; more physical, closely tied to our senses: vision, hearing, touching, tasting*
- metaphorical defined as: *more complex; more distant from our senses; more abstract; more vague; often surprising; tend to bring in imagery from a different domain*

Example 1

Focus Word: *shoot down*

Sentence: *The enemy **shot down** several of our aircraft.*

Question: In the above sentence, is the focus word used in a literal sense or a metaphorical sense?

- the focus word's usage is metaphorical
- the focus word's usage is literal

Solution: the focus word's usage is literal

Example 2

Focus Word: *shoot down*

Sentence: *He **shot down** the student's proposal.*

Question: In the above sentence, is the focus word used in a literal sense or a metaphorical sense?

- the focus word's usage is metaphorical
- the focus word's usage is literal

Solution: the focus word's usage is metaphorical

Data Generation

- each instance was annotated by at least ten annotators (70% agreement)
- those focus verbs were selected which had at least one metaphorical instance → *Master Set* 176 metaphorical and 284 literal
- *Hypothesis 1 Pairs*: to the 176 metaphorical sentences literal sentences by replacing the verb with a literal synonyms (342 instances)
- *Hypothesis 2 Instances*: grouping Master Set Instances with same verb but different sense
- *Hypothesis 2 Cross Pairs*: all combinations of metaphorical instances with same verb in literal form 355 pairs
- *Hypothesis 2 All Pairs*: all combinations 629 pairs

Questionnaire 2: Which is more metaphorical?

- *Hypothesis 2 Cross Pairs* and *Hypothesis 2 All Pairs* used
- two sentence with similar meaning and focus word given
- compare the metaphorical use of the focus word in both sentence
- possibility to answer the sentences are equally metaphorical/literal

Your Task

Focus Word 1: *attack*

Sentence 1: *I **attacked** the problem as soon as I was up.*

Focus word 2: *attack*

Sentence 2: *The Serbs **attacked** the village at night.*

Questionnaire 3: Does the focus word convey emotion?

- *Hypothesis 1* and *Hypothesis 2* instances used
- conveys the focus word some emotion
- with binary answer options

Your Task

Focus Word: *answer*

Sentence: *This steering wheel **answers** to the slightest touch.*

How much emotion is conveyed?

- the focus word conveys some emotion
- the focus word conveys no emotion

Questionnaire 4: Which of the two given sentences conveys more emotion?

- *Hypothesis 1 Pairs* used
- conveys the the focus word in one sentence more emotion than in the other?
- there are 3 answers possible (similar degree of emotion is possible too)
- more "emotional" not defined in detail

Your Task

Focus Word 1: *attack*

Sentence 1: *I **attacked** the problem as soon as I was up.*

Focus word 2: *start*

Sentence 2: *I **started** on the problem as soon as I was up.*

Results Hypothesis 1

Table 1: Summary of responses to Q3 (emotional or not emotional) for Hypothesis 1 Instances (342 instances – 171 metaphorical and 171 literal).

# instances that are:	
emotional	191 (55.8%)
not emotional	151 (44.2%)
Total	342 (100%)
<hr/>	
# instances that are:	
metaphorical and emotional	136 (39.8%)
metaphorical and not emotional	35 (10.2%)
literal and emotional	55 (16.1%)
literal and not emotional	116 (33.9%)
Total	342 (100%)

Table 2: Summary of responses to Q4 (which is more emotional) for Hypothesis 1 Pairs (171 pairs of metaphorical and literal instances).

# instances that are:	
metaphorical and more emotional	143 (83.6%)
literal and more emotional	17 (09.9%)
similarly emotional	11 (06.4%)
Total	171 (100%)

Results Hypothesis 2 I

Table 3: Summary of responses to Q3 (emotional or not emotional) for Hypothesis 2 Instances (460 instances – 176 metaphorical and 284 literal).

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# instances that are:	
emotional	82 (17.8%)
not emotional	378 (82.2%)
Total	460 (100%)
<hr/>	
# instances that are:	
metaphorical and emotional	65 (14.1%)
metaphorical and not emotional	111 (24.1%)
literal and emotional	17 (03.7%)
literal and not emotional	267 (58.0%)
Total	460 (100%)
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Table 4: Summary of responses to Q4 (which is more emotional) for Hypothesis 2 Cross Pairs (355 pairs of metaphorical and literal instances).

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# instances that are:	
metaphorical and more emotional	211 (59.4%)
literal and more emotional	31 (08.7%)
similarly emotional	113 (31.8%)
Total	355 (100%)
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Results Hypothesis 2 II

Table 5: Summary of responses to Q4 (which is more emotional) for Hypothesis 2 All Pairs (629 pairs of instances). Note that in addition to pairs where one is highly metaphorical and one highly literal, the All Pairs set also includes pairs where both instances may be highly metaphorical or both highly literal.

# instances that are more metaphorical and more emotional	227 (36.1%)
# instances that are more metaphorical but less emotional	28 (04.4%)
# instances that are more metaphorical but similarly emotional	119 (18.9%)
# instances that are similarly metaphorical and similarly emotional	196 (31.2%)
# instances that are similarly metaphorical but differ in emotionality	59 (09.4%)
Total	629 (100%)

Discussion/Conclusion

- both hypothesis confirmed
- metaphorical/literal distinction is a common pattern for polysemous verbs (38% metaphorical)
- potentially shedding light on the origins of regular polysemy and metaphor
- emotion detection as feature for algorithms for handling metaphorical sense extension
- only tested a special case of paraphrase
- encourage collaboration between sentiment analyses and metaphor analysis

Table 6: Summary of data annotated for metaphoricity and emotionality.

File	Data	Annotations
1. Data-metaphoric-or-literal.txt	WordNet Verb-Sense Instances (1639)	metaphorical or Literal (Questionnaire 1)
2. Data-Table1-emotional-or-not.txt	Hypothesis 1 Instances (342)	metaphorical or Literal (Questionnaire 1) and Emotional or Not Emotional (Questionnaire 3)
3. Data-Table2-which-is-more-emotional.txt	Hypothesis 1 Instance Pairs (171)	metaphorical or Literal (Questionnaire 1) and Which Instance is More Emotional (Questionnaire 4)
4. Data-Table3-emotional-or-not.txt	Hypothesis 2 Instances (460)	metaphorical or Literal (Questionnaire 1) and Emotional or Not Emotional (Questionnaire 3)
5. Data-Table4-which-is-more-emotional.txt	Hypothesis 2 Instance Pairs (355)	metaphorical or Literal (Questionnaire 1) and Which Instance is More Emotional (Questionnaire 4)
6. Data-Table5-which-is-more-emotional.txt	Hypothesis 2 Unmarked Pairs (629)	Which Instance is more metaphorical (Questionnaire 2) and Which Instance is More Emotional (Questionnaire 4)

Bibliography

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Discussion