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GerVADER

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Outline

1. VADER - Benefits and Concept
2. VADER - building block: encyclopedia
3. From VADER to GerVADER
4. GerVADER in six steps
5. Suitable corpora and test data
6. GerVADER Results

VADER – Benefits and concept

- From: C.J. Hutto and Eric Gilbert
- Rated English sentences **positiv**, **negativ** or **neutral** (sentiment)
 - On a scale from -1 to 0 to +1
- MIT license, available on GitHub
- Easy to use: 1 Python script
- **Without Machine Learning** → **Lexicon and rule-based analysis tool**
- Evaluates individual records using
 - Single word sentiments (encyclopedia)
 - Rating of individual words (**pos**, **neg**, **neu**)
 - 5 Heuristics
 - Reinforcement, reduction, inversion of a sentiment

VADER – Benefits and concept

- Very good scores in social media domains
 - o Designed specifically for this purpose

VADER is smart, handsome, and funny!

positive

```
{'pos': 0.752, 'compound': 0.8439, 'neu': 0.248, 'neg': 0.0}
```

Today SUX!

negative

```
{'pos': 0.0, 'compound': -0.5461, 'neu': 0.221, 'neg': 0.779}
```

Comparison of VADER to SOTA

	3-Class Classification Accuracy (F1 scores)			
	Test Sets			
	Tweets	Movie	Amazon	NYT
VADER	0.96	0.61	0.63	0.55
NB (tweets)	0.84	0.53	0.53	0.42
ME (tweets)	0.83	0.56	0.58	0.45
SVM-C (tweets)	0.83	0.56	0.55	0.46
SVM-R (tweets)	0.65	0.49	0.51	0.46
NB (movie)	0.56	0.75	0.49	0.44
ME (movie)	0.56	0.75	0.51	0.45
NB (amazon)	0.69	0.55	0.61	0.48
ME (amazon)	0.67	0.55	0.60	0.43
SVM-C (amazon)	0.64	0.55	0.58	0.42
SVM-R (amazon)	0.54	0.49	0.48	0.44
NB (nyt)	0.59	0.56	0.51	0.49
ME (nyt)	0.58	0.55	0.51	0.50

see [VADER] in Sources

VADER – Building block: Encyclopedia

- For each word a sentiment rating from -4 to 0 to +4
- Compiled from crowd ratings of participants
- Each rating with -4 to +4 (negative to positive word)
- Average value formed
- Word is recognized in sentence and sentiment assigned to it

From VADER to GerVADER

- **Idea:** German adaptation of the English method
- Same algorithm
- Exchange of the English encyclopedia with the German encyclopedia
- Partial adjustment of heuristics and some code lines in the algorithm

GerVADER - in six steps

1. Lexicon compilation
2. Crowd rating the lexicon words by polarity (-4, -3, ..., 0, +1, ..., +4) (Wisdom Of The Crowd)
3. Filter words -> Gold standard lexicon
4. Installation of 5-language heuristics as boost factors
5. e.g. !, !!, !!!, or **negation**...
6. Small adjustments
7. Testing VADER in *different domains* against *common algorithms* (benchmark)

1. Compile encyclopedia

- Initial situation: SentiWS Lexicon
 - Lexicon including grammatical word forms
- Supplemented by 80 German slang expressions
 - Slang common in social media channels

→ Encyclopedia for the evaluation of the Crowd: **3,546** words

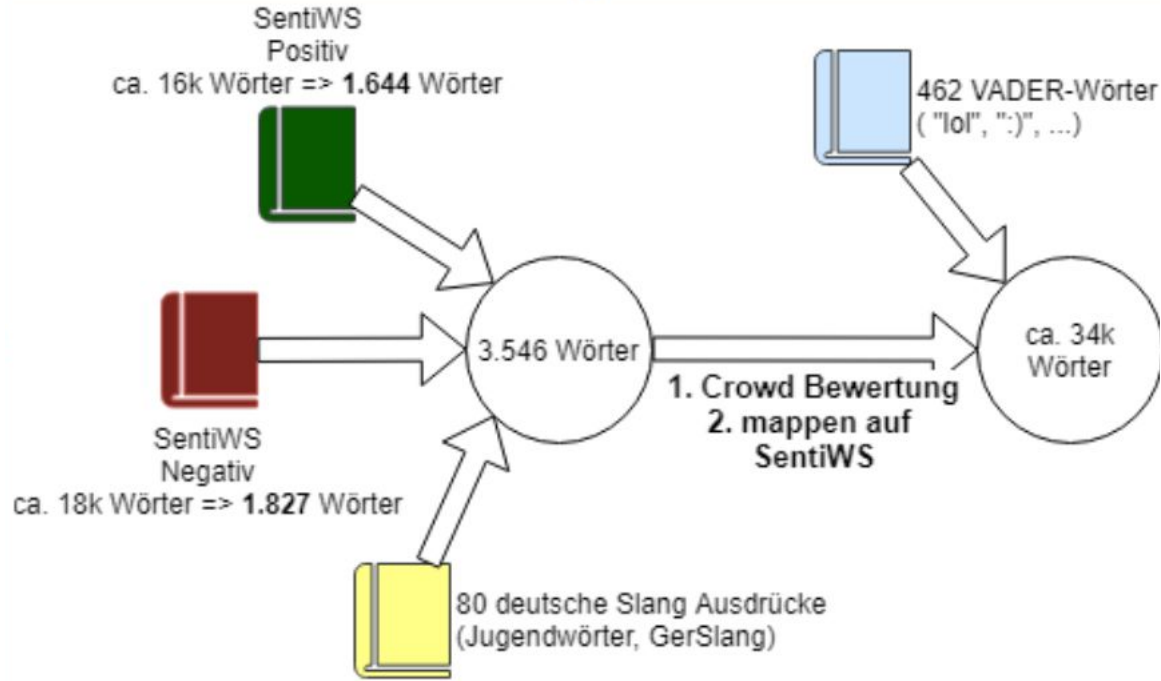
2. Crowd Rating

- Rating of the words (-4 to +4) by 10 headed crowd members
- Approx. 7 reviews per word received

3. Filter words → Gold standard lexicon

- Filter: Words with neutral sentiment and high standard deviation (> 2.5)
 - Crowd disagree in rating
 - Hayvan 2.5 [+1, +1, -1, -4, +4, -4, +0, +0]
- Expand: Words extended to grammatical forms, sentiment adopted
 - agil = [agilstes, agilster, agileren, ...]
- Added cross-language VADER words
 - 462 VADER words ("lol", "rofl", ...)
 - 3,500+ VADER Emojis

Compilation process: Review and mapping



4. Translating the 5-Heuristics from VADER

Punctuation ! can boost the sentiment of the sentence

1. Punctuation: ! vs !! vs !!! vs .

- Punctuation ! can boost the sentiment of the sentence
- "VADER is smart, handsome, and funny."
- "VADER is smart, handsome, and funny!"

2. ALL-CAPS

- Strengthens the sentiment of the word
- "VADER is very smart, handsome, and funny."
- "VADER is VERY SMART, handsome, and FUNNY!!"

4. Translating the 5-Heuristics from VADER

3. **Booster Words**

- amplify/attenuate the next word
- "It is good"
- "It is **extremely** good"

4. **Contrast-conjunction (contrast)**

- Follow-up part is given increased attention
- "The food is great, **but** the service sucks"

5. **Negating sentence**

- Sentiment tips over
- "VADER is **not** smart, handsome, nor funny."

Just **Booster Words** and **Negating sentence** adapted for **GerVADER** → Words were manually translated

5. Small adaptations

- VADER transforms currently viewed word into lowercases
- but in German nouns are written in capital letters
- GerVADER encyclopedia has same words with different POS tag

Anstieg 1.1 0.8 [+1, +1, +0, +3, +1, +1, +1]

anstieg 0.7 0.7 [+0, +0, +0, +2, +1, +1]

therefore:

1. search currently viewed word in encyclopedia
2. if not found, lowercase() the word and search in lexicon
3. if not found, first letter capitalize() and search in lexicon

6. Benchmarking - Twitter Corpus + Google Play Corpus

A Twitter Corpus and Benchmark Resources for German Sentiment Analysis

- Paper that collected tweets with more than 9000 tweets and manually labeled them (SB10k Corpus)
 - o Got only '7500' on request
- Google Play Store Reviews (SCARE Corpus), 800.000+ Reviews
 - o Different categories, e.g. Sport News Apps

GerVADER - Results

No.	Classifier	Training Corpus	Test Corpus	F1pos	F1neg	F1neutral	F1	F1-3
1	GerVADER	-	SB10k	43,54%	35,30%	40,69%	39,42%	39,84%
2	GerVADER	-	SB10k (NN)	74,50%	53,73%	-	64,12%	
3	GerVADER	-	SB10k (10%)	44,52%	37,64%	42,01%	41,08%	41,39%
4	GerVADER	-	SB10k (10%, NN)	73,15%	55,23%	-	64,19%	
5	SVM	SB10k	SB10k (10%)	66,16%	47,80%	81,32%	56,98%	65,09%
6	CNN	SB10k	SB10k (10%)	71,46%	58,72%	81,18%	65,09%	70,45%
7	SVM	MGS	SB10k (10%)	67,77%	53,23%	80,20%	60,50%	67,07%
8	CNN	MGS	SB10k (10%)	63,94%	58,21%	70,66%	61,08%	64,27%
9	GerVADER	-	SportNews	85,41%	55,05%	12,71%	70,23%	51,06%
10	GerVADER	-	SportNews (NN)	88,07%	57,78%	-	72,93%	
11	GerVADER	-	SportNews (NN, N merged into P)	90,72%	57,78%	-	74,25%	
12	GerVADER	-	News Apps	80,63%	58,14%	11,78%	69,39%	50,18%
13	GerVADER	-	News Apps (NN)	83,73%	60,75%	-	72,24%	
14	GerVADER	-	News Apps (NN, N merged into P)	85,77%	60,75%	-	73,26%	

GerVADER - Results

SB10k Corpus

		PREDICTED							
		pos	neg	neu					
		4034	1499	1943	Precision	Recall	f1 Score		
ACTUAL	pos	1717	1252	133	332	pos	0,3103619236	0,7291788002	43,54%
	neg	1130	392	464	274	neg	0,3095396931	0,410619469	35,30%
	neu	4629	2390	902	1337	neu	0,6881111683	0,2888312811	40,69%
7476							F1		39,42%
							F1(3)		39,84%

SB10k Corpus - Neutral tweets previously filtered out

		PREDICTED							
		pos	neg	neu					
		1644	597	606	Precision	Recall	f1 Score		
ACTUAL	pos	1717	1252	133	332	pos	0,7615571776	0,7291788002	74,50%
	neg	1130	392	464	274	neg	0,7772194305	0,410619469	53,73%
	neu	0	0	0	0	neu			
2847							F1		64,12%
							F1(3)		

GerVADER - Results

- SB10k can only be compared moderately, since it is not known on which 10% the authors have tested.
- SCARE positive, negative, neutral star classification (1-2 neg; 3 neu; 4-5 pos)
- **positive statements** are quite well recognized
- **negative statements** are almost equally distributed on all three labels
- **neutral statements** are often recognized as positive

		PREDICTED			
			pos	neg	neu
			29041	4977	4003
ACTUAL	pos	26912	23896	676	2340
	neg	8360	3455	3671	1234
	neu	2749	1690	630	429

Negative statements are almost equally distributed on all 3 labels

GerVADER recognizes negation words in long sentences, but has no effect:

- 'Ich finde **nicht**, dass diese Menschen wirklich freundlich sind.'
→ positive, but should be negative

Negative words only affect the nearest neighbours

- between **nicht** and freundlich too great a distance
- with long sentences or funny sentences this leads to wrong classifications

Negative statements are almost equally distributed on all 3 labels

What happens here?

- 6 negative Ach verdammt. Nich groß genug! .-. rated **positive**
- 7 negative Ach verdammt. Groß genug! .-. rated **positive**
- 8 negative Ach verdammt. Nicht Groß genug! .-. rated **negative**
- 9 negative Verdammt! .-. rated **neutral**

verdammt & .- = is not recognized Nich = is not a deposited negation word

-. = nicht Teil des Lexikons

- some words are **not recognized**, if they are also stored as **booster words**
- incorrect spelling and words written together are **not recognized** either

Conclusion

- Copura often lacks context information and missing irony recognition
- Boosters and negation words must be translated/selected more adequately
- German negation ("nicht" at end of sentence) and long sentences with negation are not recognized
- Contrast conjunction "aber" is not even recognized yet
- Subset of emoticons are not recognized or missing in the lexicon
- Potential for improvement, especially with regard to the algorithm

But:

- SCARE Corpus Benchmark already promises good results
- Fixing the above problems could bring **GerVADER** much closer to **VADER** results

Sources

[more details in paper sources](#)

SentiWS:

R. Remus, U. Quasthoff & G. Heyer: SentiWS - a Publicly Available German-language Resource for Sentiment Analysis.

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<http://www.romanklinger.de/scare/>

Sources

[more details in paper sources](#)

SB10k:

Cieliebak, Mark & Deriu, Jan & Egger, Dominic & Uzdilli, Fatih. (2017). A Twitter Corpus and Benchmark Resources for German Sentiment Analysis. Social NLP @ EACL. 10.18653/v1/W17-1106.

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VADER:

Hutto, C.J. & Gilbert, E.E. (2014). VADER: A Parsimonious Rule-based Model for Sentiment Analysis of Social Media Text. Eighth International Conference on Weblogs and Social Media (ICWSM-14). Ann Arbor, MI, June 2014.

<https://github.com/cjhutto/vaderSentiment>