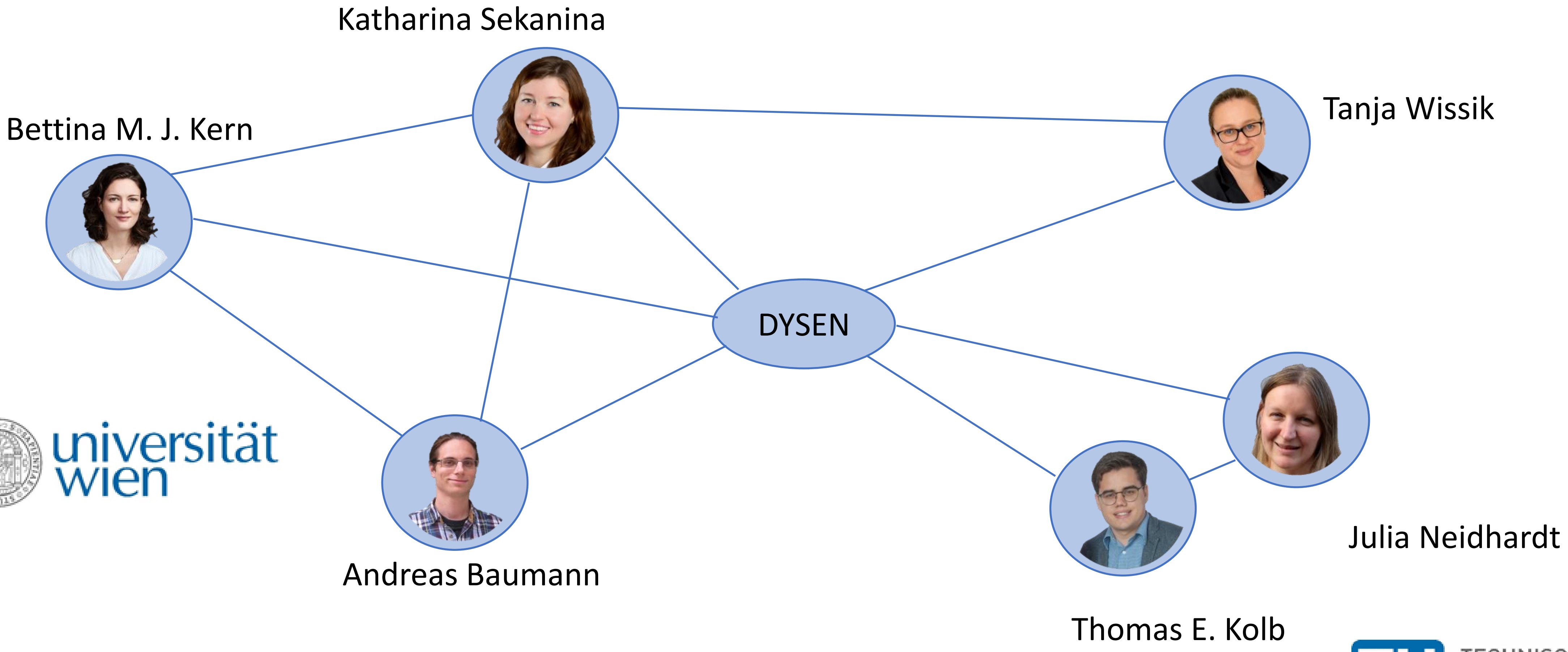
Creating an Austrian Language Polarity Dictionary with the Crowd

Thomas E. Kolb, Katharina Sekanina, Bettina M. J. Kern,
Julia Neidhardt, Andreas Baumann and Tanja Wissik

NLP Seminar @ TU Wien

Funded by:
Stadt Wien *Grant number: MA7-737909/19*
ÖAW Österreichische Akademie der Wissenschaften
universität wien
TU Wien Technische Universität Wien

Project Team

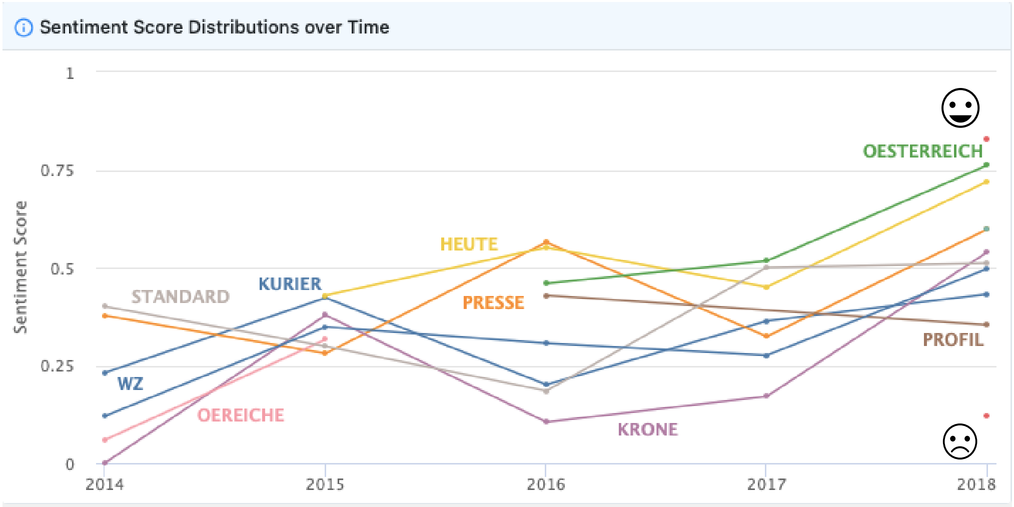


DYSEN Project

Dynamic **Sen**timent Analysis as Emotional Compass for the Digital Media Landscape

Research question: How do print media report about the Viennese politicians?

Aim of the project: Develop a tool that can detect change of emotional polarization of politicians in Austrian Newspapers



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Stadt Wien *Grant number: MA7-737909/19*

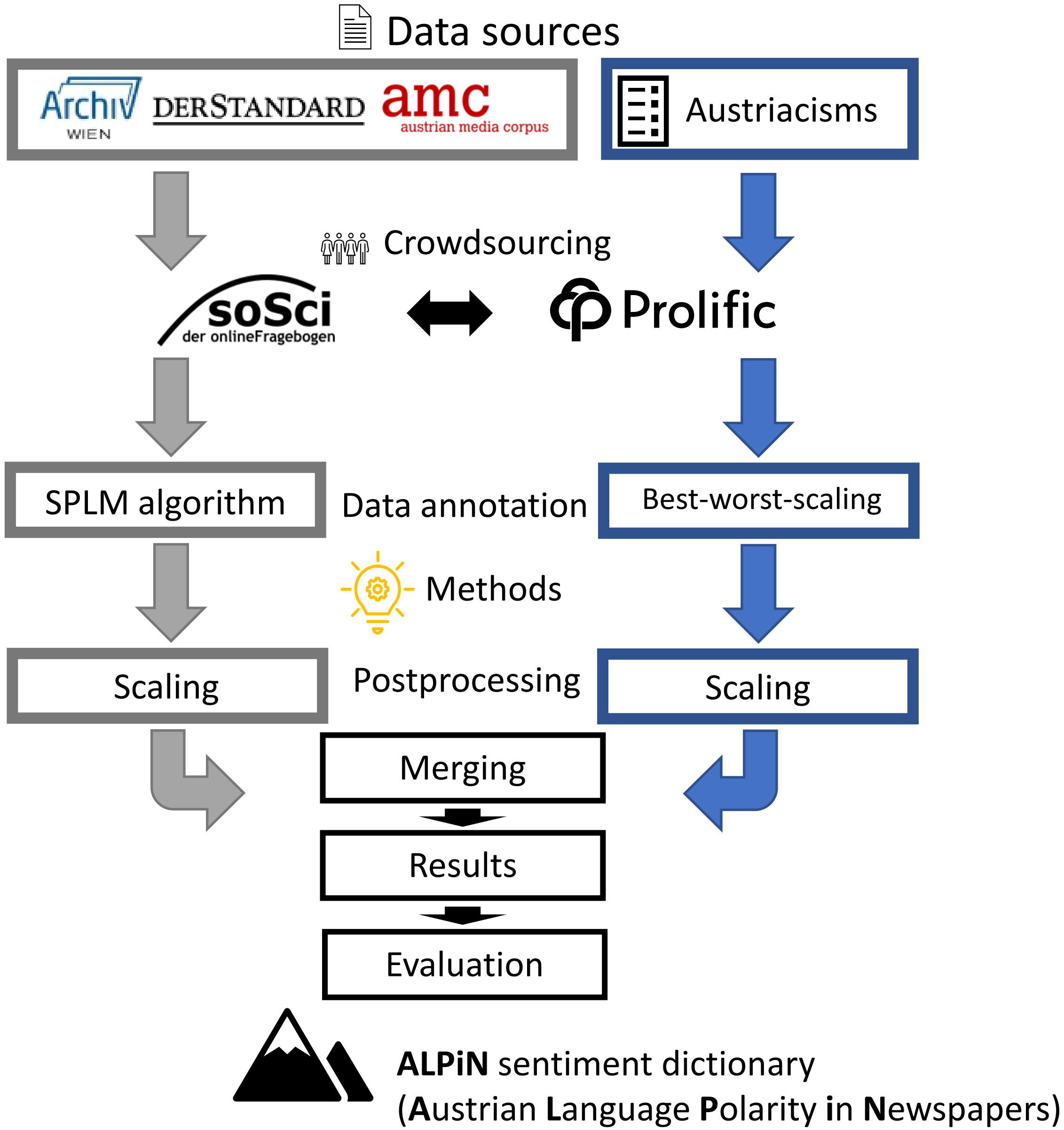
https://dylen.acdh.oeaw.ac.at/dysen/

Problem Statement

There is no sentiment dictionary for Austrian German in this domain

Goal: Create Austrian German language resource in the domain of news media and politics

Content



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amc austrian media corpus
Austriacisms
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soSci der onlineFragebogen
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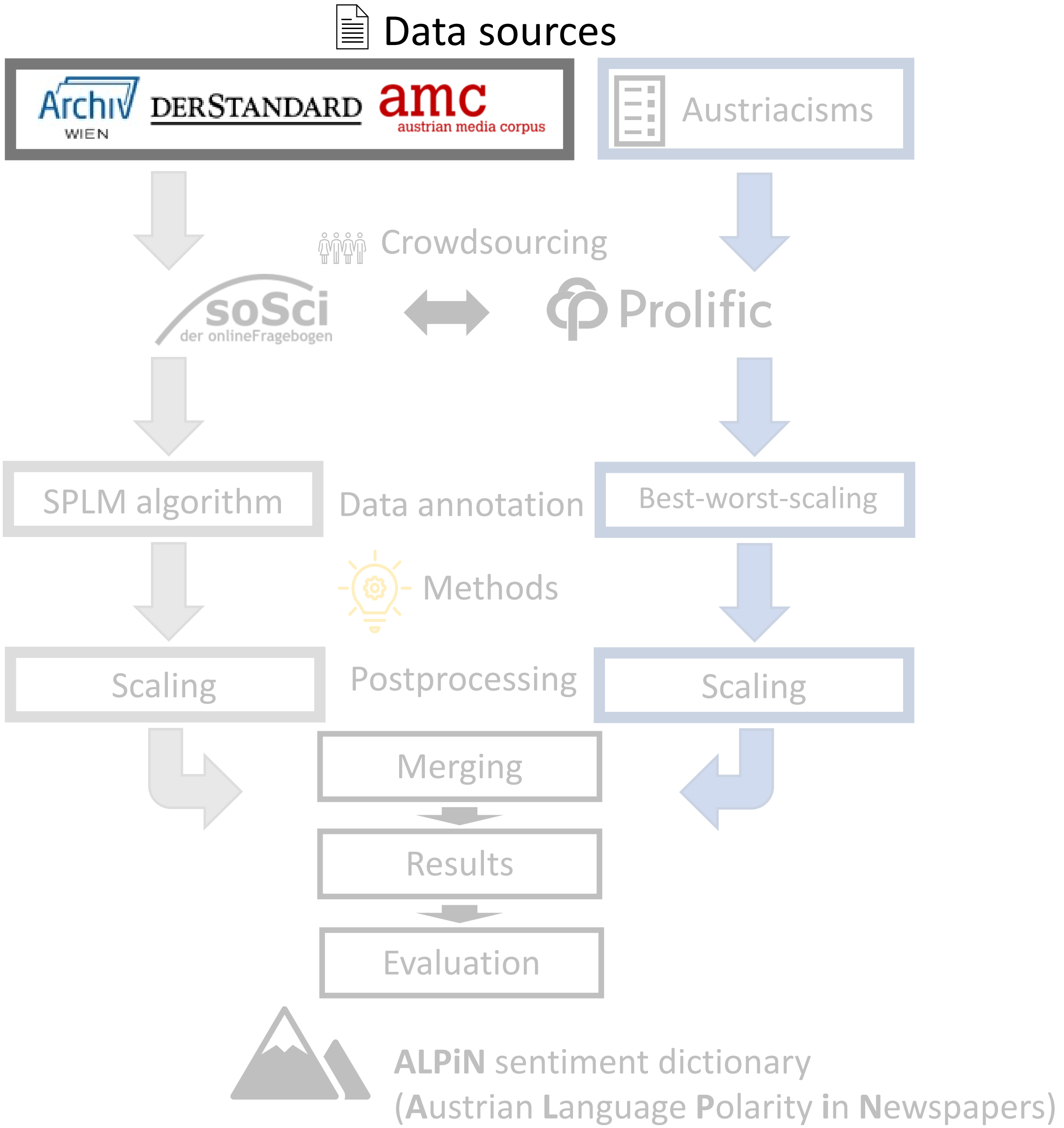
ALPiN sentiment dictionary
(**A**ustrian **L**anguage **P**olarity **i**n **N**ewspapers)

Content



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ALPiN sentiment dictionary
(Austrian Language Polarity in Newspapers)

Data sources: Viennese politicians

Retrieved from the politician archive of Vienna (POLAR) of the Vienna City and State Archives.

Definition of "Viennese politician": All members of the

- Vienna City Council
- Vienna City Senate
- Vienna State Parliament
- Vienna State Government

who were active between the 13th and the 20th parliamentary term (1983 to 2020) = **<u>487 politicians</u>**

Data sources: DERSTANDARD (1 Million Posts Corpus)

(Schabus et al., 2017)

- Forum posts of 12 months from 2015 to 2016
- 3599 posts labelled for sentiment by professional forum moderators

	ID_Post	Body	Category
0	3326	Top qualifizierte Leute verdienen auch viel.	SentimentNeutral
1	5321	Gott sei dank ist für sie eine Umfrage alles, ...	SentimentNegative
2	5590	Sorry, aber die FPÖ tut eigentlich gar nichts ...	SentimentNeutral
3	6015	Weil es dein meisten Leuten verständlicherweis...	SentimentNegative
4	8213	Na wer weis was da vorgefallen ist...	SentimentNeutral

```
SentimentNeutral     1865
SentimentNegative    1691
SentimentPositive      43
```

Data sources: amc austrian media corpus Austrian Media Corpus

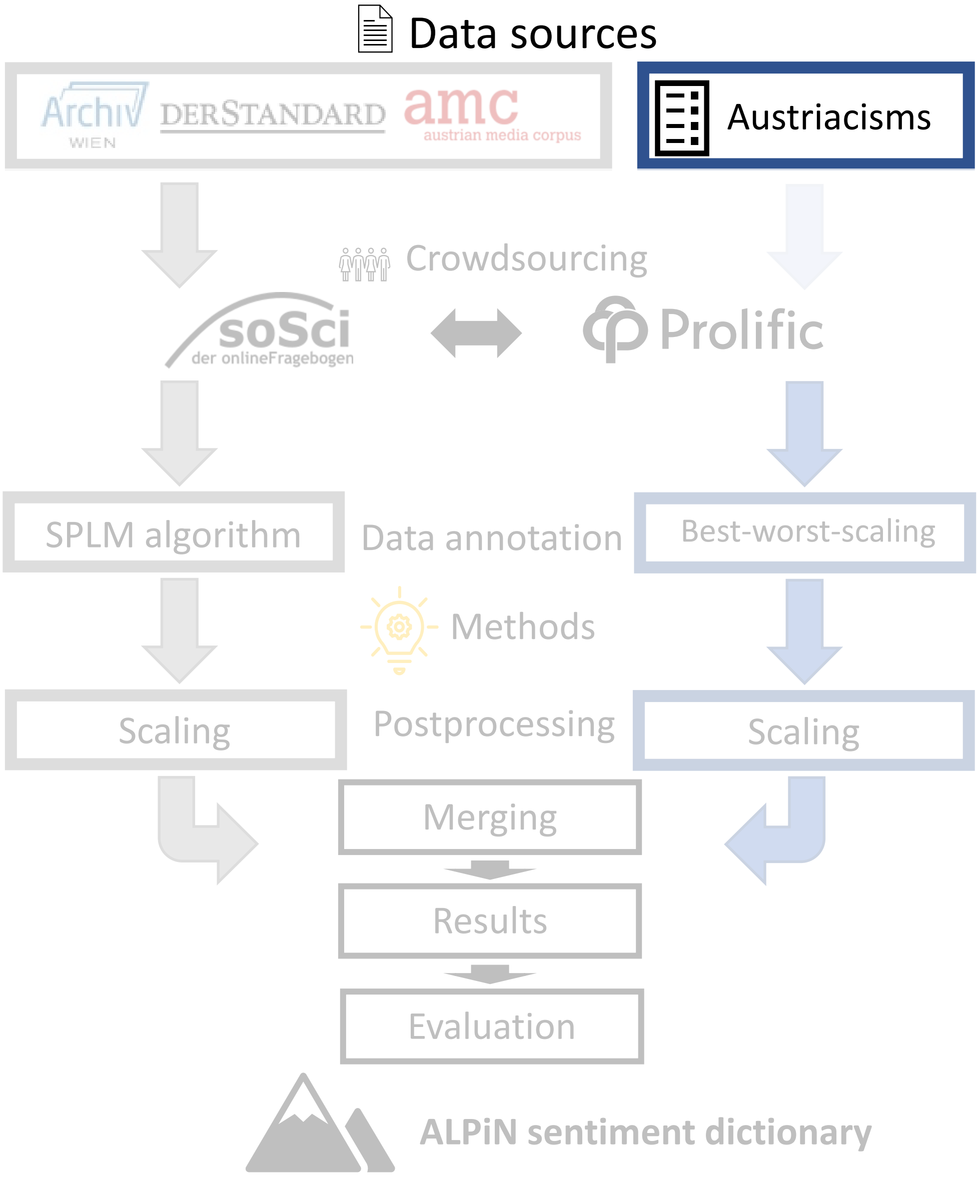
(Ransmayr et al.,2017)

- Contains Austrian print media
- Preprocessed and linguistically annotated
- Yearly updates

Our data:

- We use print media related to Vienna between 1996 and 2017
- Excluded APA[1] and OTS[2] articles *("Presseaussendungen")*
- Text snippets of 60 tokens around the politicians' name were extracted

1. https://apa.at/
2. https://www.ots.at/



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Data sources: Austriacisms

Based on:

- „Variantenwörterbuch des Deutschen“ (VWB; words specific to Austria) (Bickel et al.,2015)
- Austriacism list of Wikipedia[1]

Restrictions:

The combined list is manually checked and cleaned up by linguist experts of our project team = **<u>538 remaining words</u>** *(pos tagged with: noun, adjective, verb)*

1. https://de.wikipedia.org/wiki/Liste_von_austriacismen

Crowdsourcing

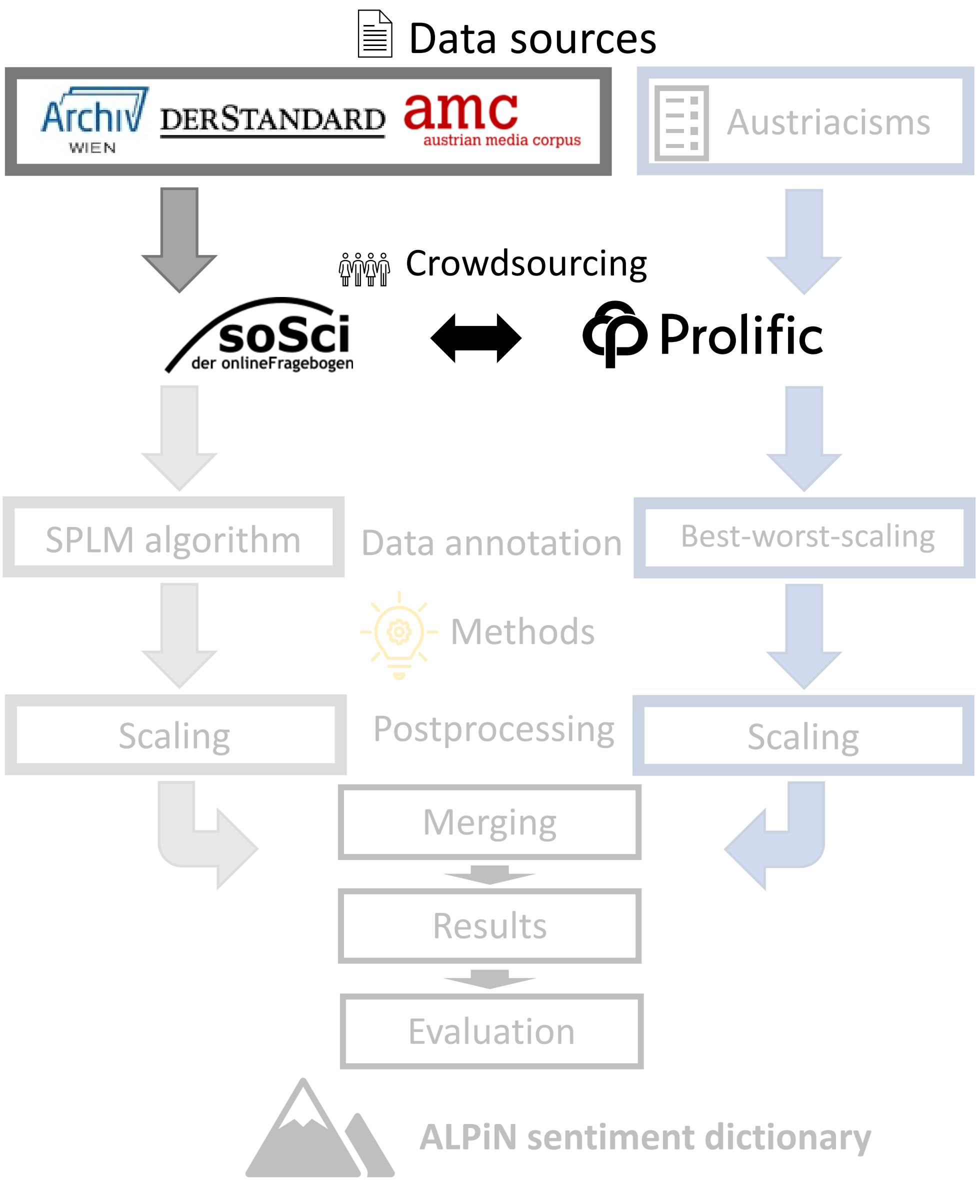
Aim: Attain sentiment annotations from the crowd for:

- Text snippets from the amc data that mention Viennese politicians
- Austriacism list

By using:

- SoSci Survey[1]: platform for designing surveys
- Prolific[2]: platform to find research participants who fill out the survey

1. https://www.soscisurvey.de/
2. https://www.prolific.co/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Crowd sourcing: amc austrian media corpus Austrian Media Corpus

- Each item labelled ≥ 3 times
- Majority vote (equal number per class = rated as neutral)
- Three classes: positive, neutral, negative
- Survey:
  - 100 randomly selected text snippets
  - +24 items for quality control (≥75% correct)

Restricted annotators by:

- Current Country of Residence (Germany, Austria, Switzerland)
- Nationality (Germany, Austria, Switzerland)
- First Language (German)

Crowd sourcing: amc austrian media corpus Austrian Media Corpus

1st annotation run (70 annotators after excluding the 14 bad ones)

- 2376 items
- Fleiss-Kappa: 0.295 (fair inter-annotator agreement)

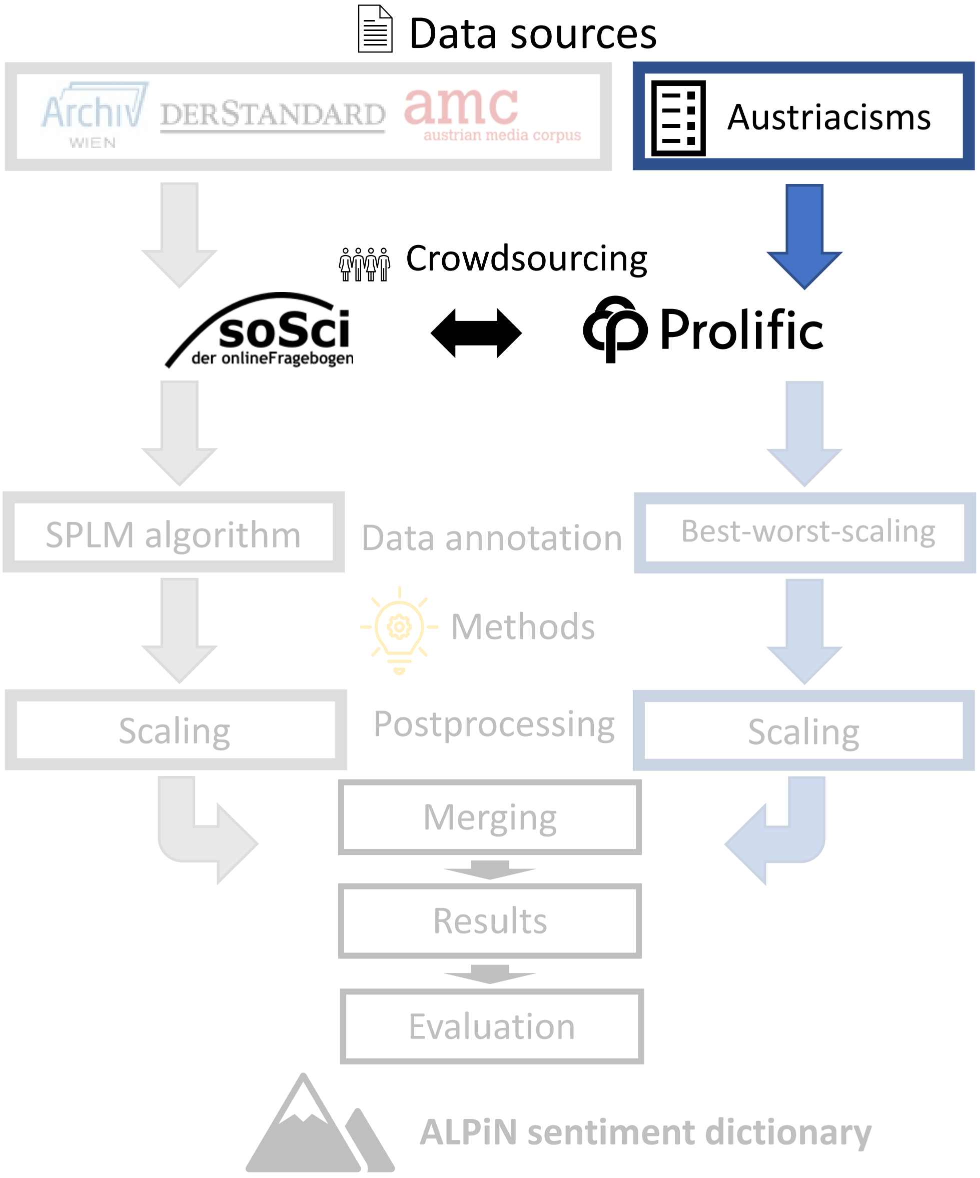
neutral	1202
positive	598
negative	576

2nd annotation run (88 annotators after excluding the 15 bad ones)

- 2970 items
- Fleiss-Kappa: 0.283 (fair inter-annotator agreement)

neutral	1492
positive	787
negative	691

Output: 5346 labelled text snippets including Viennese politicians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Crowd sourcing: Austriacisms (Survey 1)

Survey 1 (Preselection):

- Over 1 600 words in total
- 500 words per survey
- +25 words for quality control
- Four options (positive, neutral, negative, unknown)

Restricted annotators by:

- Current Country of Residence (Austria)
- Nationality (Austria)
- First Language (German)

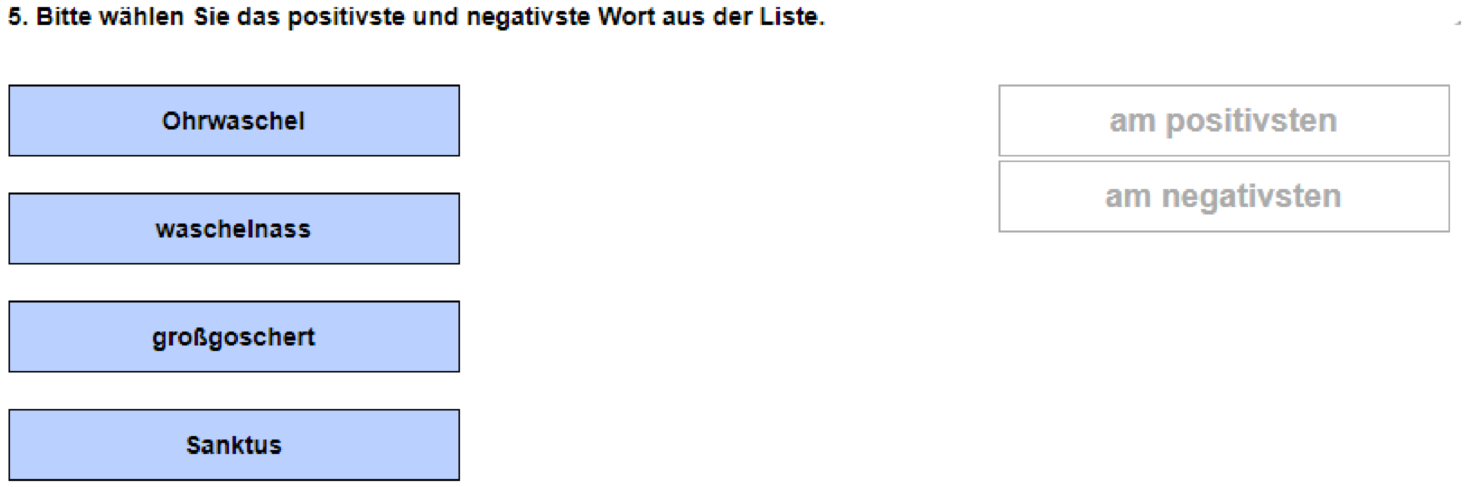
	negativ	neutral	positiv	unbekannt
lebensbejahend	○	○	○	○
Seuche	○	○	○	○
Vernaderer	○	○	○	○
Gewand	○	○	○	○

Crowd sourcing: Austriacisms (Survey 2)

Survey 2:

- Best-worst-scaling (BWS) method[1] (Kiritchenko & Mohammad, 2017)
- 1074 tuples
- 130 tuples per survey
- +20 tuples for quality control (≥75% correct)

- **Restricted annotators by:**
- Current Country of Residence (Austria)
- Nationality (Austria)
- First Language (German)



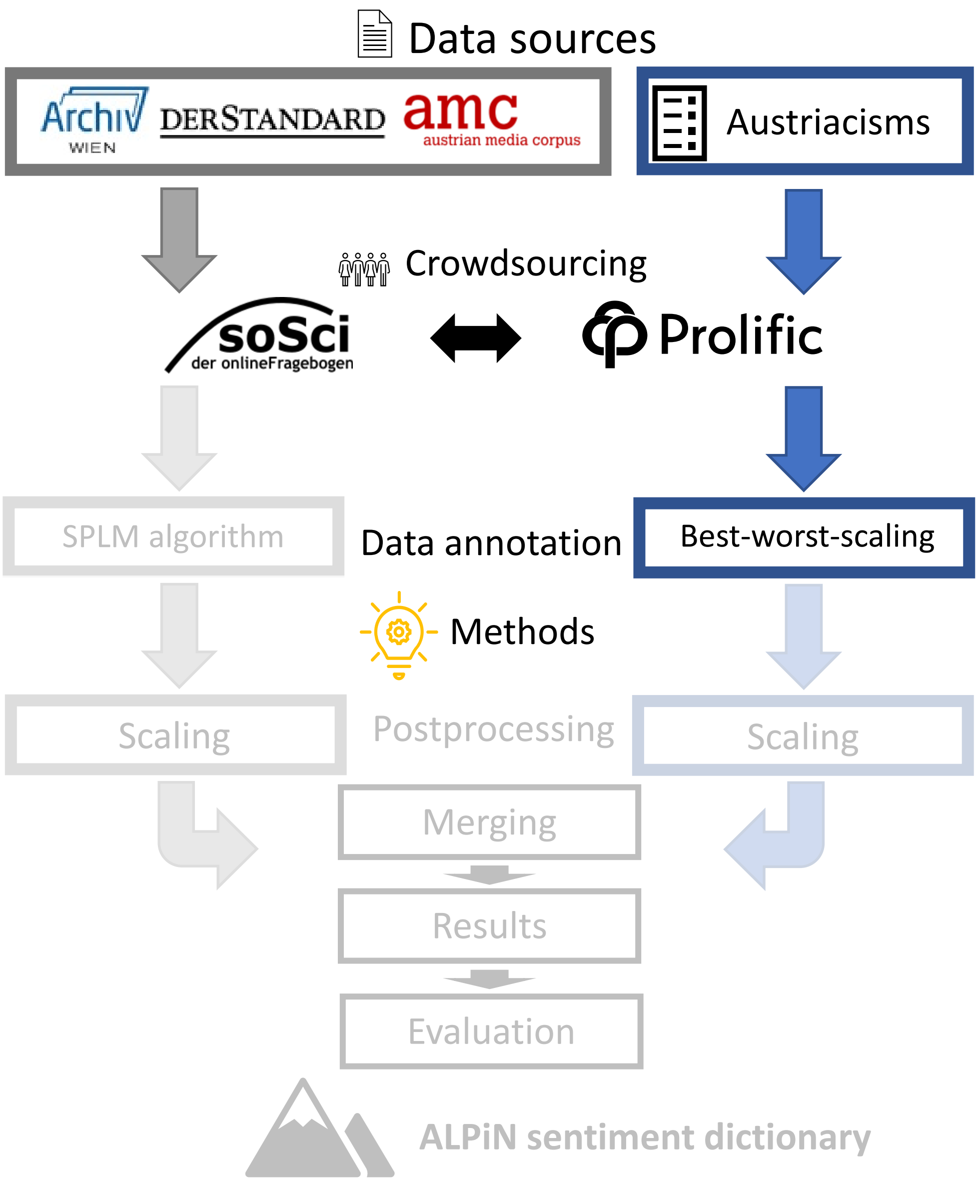
1. Calculation script provided by Mohammad: http://saifmohammad.com/WebPages/BestWorst.html

Crowd sourcing: Austriacisms

- 34 annotators after excluding the 6 bad ones
- **Output:** 4417 tuples (BestItem, WorstItem)

	Item1	Item2	Item3	Item4	BestItem	WorstItem
0	Rodel	Knödelakademie	Keiler	Gelenksbeschwerden	Rodel	Gelenksbeschwerden
1	brennheiß	Stornoversicherung	Scherz(e)l	sich ausgehen	sich ausgehen	brennheiß
2	Steireranzug	Causa	Pönale	Lokalaugenschein	Lokalaugenschein	Steireranzug
3	Alumnat	Beiwagerl	Servus	kiefeln	Servus	kiefeln
4	Patschenkino	Aufnahmestopp	Straßenerhalter	Marmeladinger	Straßenerhalter	Aufnahmestopp
...	...	...	...	...	...	...
4412	ferten	Ermäßigungsausweis	Halbpreispass	versumpern	Ermäßigungsausweis	versumpern
4413	Zuhaus	Bramburi	Mistbauer	Beiwagerl	Zuhaus	Mistbauer
4414	Oja!	ludeln	Rettung	gar	Oja!	ludeln
4415	Stützlehrer	Mascherl	Einspänner	grauslich	Mascherl	grauslich
4416	Jausenbrot	enthaften	versperren	Schubhaft	Jausenbrot	Schubhaft

4417 rows × 6 columns



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Methods: Data Annotation (Autriacisms)

Best-worst-scaling (BWS) method (Kiritchenko & Mohammad, 2017)

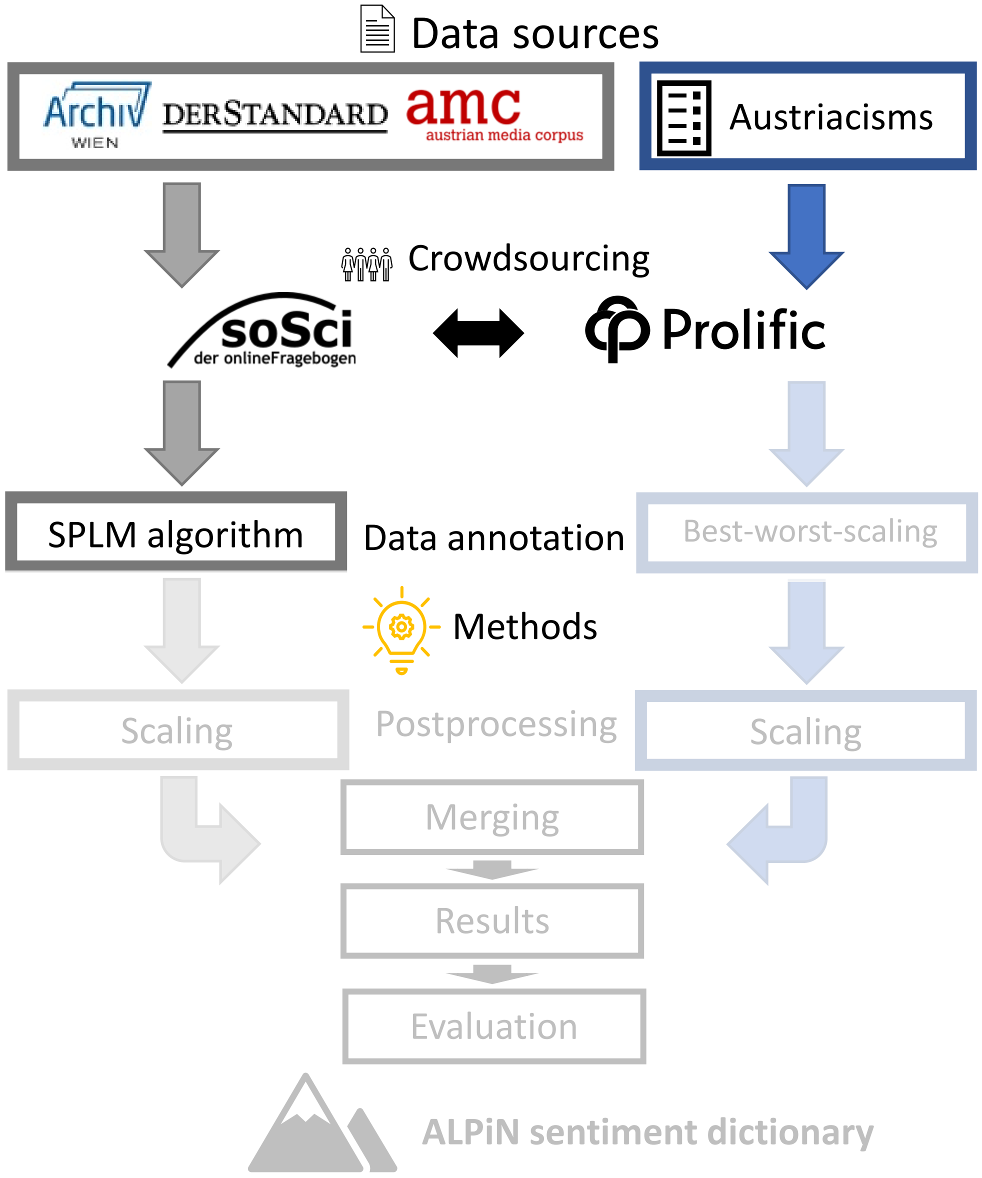
	word	tag	short-tag	score	scaled
0	fesch	ADJ	a	0.882	0.910217
1	Zuckerl	NOUN	n	0.879	0.907121
2	Topfenpalatschinke	NOUN	n	0.857	0.884417
3	leiwand	ADJ	a	0.853	0.880289
4	Ersparnis	NOUN	n	0.844	0.871001
...	...	...	...	...	...
533	Schussattentat	NOUN	n	-0.844	-0.871001
534	Exekution	NOUN	n	-0.848	-0.875129
535	speiben	VERB	v	-0.875	-0.902993
536	Brandleger	NOUN	n	-0.879	-0.907121
537	Fotze	NOUN	n	-0.969	-1.000000

538 rows × 5 columns

split-half reliability:

- Spearman correlation: 0.9159 +/- 0.0051
- Pearson correlation: 0.9164 +/- 0.0049

Output: 537 words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Methods: Data Annotation (amc, derStandard)

SPLM method (Almatarneh & Gamallo, 2018)

Algorithm to generate a sentiment score based on labelled text items.

Remark: “neutral” sentiment labels of the derStandard dataset were converted to “positive”. This was required to the high imbalance in the dataset.

```
SentimentNeutral     1865
SentimentNegative    1691
SentimentPositive      43
```

Methods: Data Annotation (amc, derStandard) preprocessing (1)

amc

„Lemma“ and „POS“ based on the amc corpora[1] (RFTagger/Tiger corpus)

derStandard

„Lemma“ and „POS“ based on spacy („de_core_news_sm“)

POS Lemma

	text	polarity
0	[(X, Top), (ADJ, qualifizieren), (NOUN, Leute)...	neutral
1	[(NOUN, Gott), (AUX, sein), (ADP, danken), (AU...	negative
2	[(PUNCT, "), (DET, der), (PROPN, FPÖ), (AUX, w...	neutral
3	[(SCONJ, Weil), (PRON, ich), (DET, mein), (DET...	negative
4	[(INTJ, Na), (PRON, wer), (NOUN, weis), (PRON,...	neutral

example based on the derStandard dataset

1. https://amc.acdh.oeaw.ac.at/dokumentation/korpusinhalt-attribute/#pos

Methods: Data Annotation (amc, derStandard) preprocessing (2)

Map result of „POS“ tagging to „wordnet“ tags to reduce the number of tags:

amc

```
tag = {
    'ADJA':wn.ADJ,  # attributive adjectives
    'ADJD':wn.ADV,  # adjective with predicative or adverbial usage
    'ADV':wn.ADV,   # adverbs
    'N':wn.NOUN,    # Noun
    'VFIN':wn.VERB, # finite verb
    'VIMP':wn.VERB, # imperative verbs
    'VINF':wn.VERB, # infinitival verb
    'VPP':wn.VERB   # participle verb
}
```

derStandard

```
# https://universaldependencies.org/u/pos/
tag = {
    'ADJ':wn.ADJ,   # adjective
    'ADV':wn.ADV,   # adverbs
    'NOUN':wn.NOUN, # noun
    'PRON':wn.NOUN, # proper noune
    'PROPN':wn.NOUN, # proper noun
    'VERB':wn.VERB  # verb
}
```

POS wordnet

wordnet tag

	polarity	text
0	neutral	[(so, r), (eine,), (Ansinnen, n), (scheinen, ...
1	negative	[(Roland, n), (Sperk, n), (Vorsitzende, n), (d...
2	neutral	[(feiern, v), (werden, v), (in,), (Szenelokal...
3	neutral	[(in,), (die,), (ÖVP, n), (machen, v), (sich...
4	neutral	[(bei,), (eine,), (Erfolg, n), (die,), (Vol...
...	...	...
8909	positive	[(Russland, n), (ist,), (in,), (wk1,), (vor...
8910	positive	[(Was,), (tendenziell, r), (kein,), (schlech...
8911	positive	[(Was,), (Unsinn, n), (Der,), (Linguistik, n...
8912	negative	[(wien, n), (verschreckt, v), (investoren, v),...
8913	negative	[(Früher, r), (haben,), (sie,), (ein,), (vi...

8914 rows × 2 columns

Methods: Data Annotation (amc, derStandard) result (1)

	word	Tag	D
8293	auch	r	1.807385e-03
9541	ich	n	1.655992e-03
3533	sehr	r	1.094594e-03
6266	geben	v	8.939163e-04
1139	Frau	n	8.637304e-04
...	...	...	...
3729	Quote	n	1.707558e-06
3758	notwendig	r	1.542211e-06
1252	klar	r	1.542211e-06
2394	überhaupt	r	1.211518e-06
7530	brauchen	v	8.808251e-07

4675 rows × 3 columns

positive words

	word	Tag	D
4949	haben	v	-2.215640e-03
2837	sein	v	-1.959662e-03
1552	hier	r	-9.608509e-04
5185	Flüchtling	n	-9.493369e-04
4123	nur	r	-8.721120e-04
...	...	...	...
7736	Anton	n	-1.653465e-07
10822	David	n	-1.653465e-07
1595	Spital	n	-1.653465e-07
3735	Einkommen	n	-1.653465e-07
9023	Typus	n	-1.653465e-07

4392 rows × 3 columns

negative words

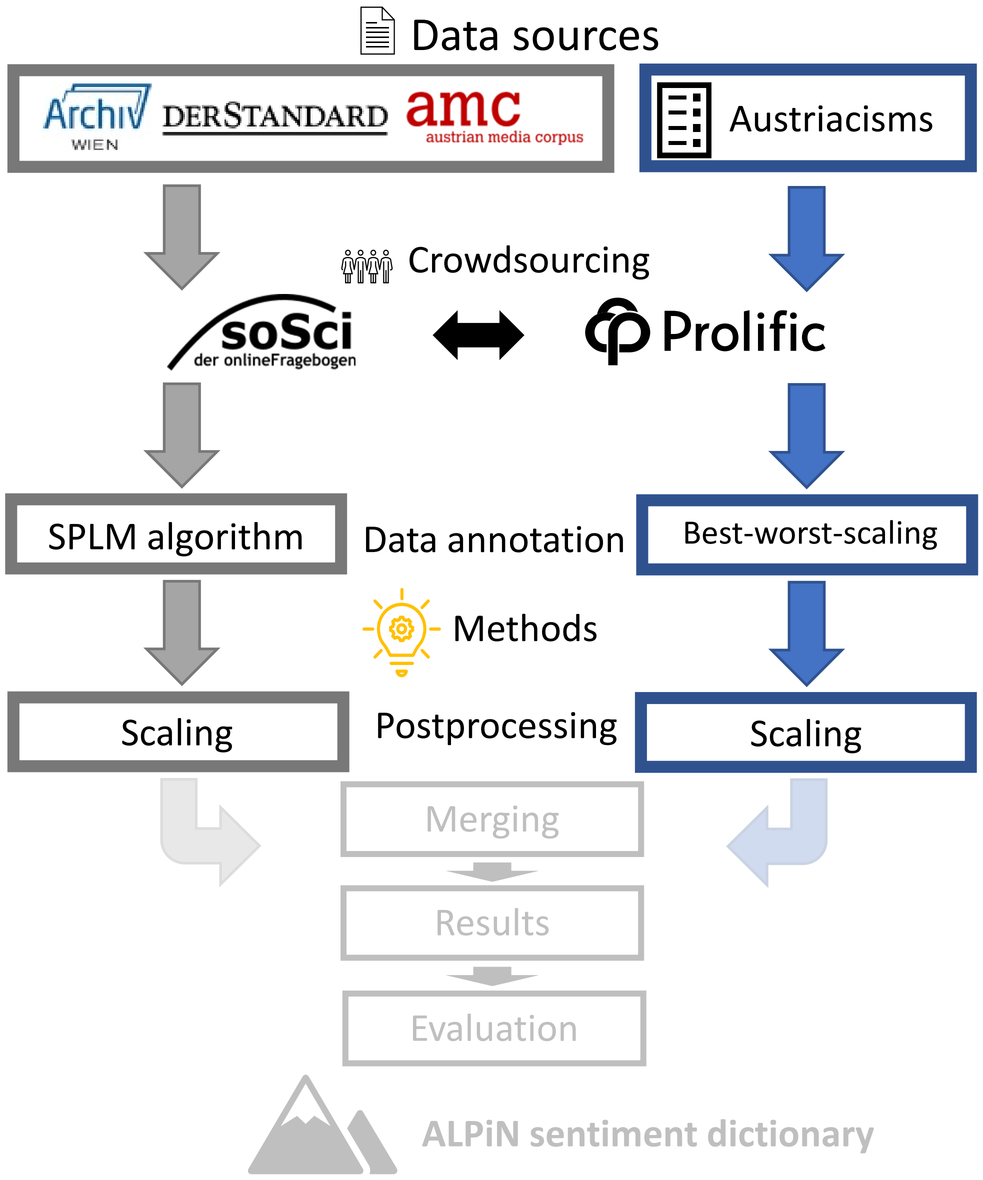
D(w): sentiment score
D(w) [-1;+1]

Methods: Data Annotation (amc, derStandard) result (2)

	word	Tag	D
0	auch	r	0.001807
1	ich	n	0.001656
2	sehr	r	0.001095
3	geben	v	0.000894
4	Frau	n	0.000864
...	...	...	...
9062	nur	r	-0.000872
9063	Flüchtling	n	-0.000949
9064	hier	r	-0.000961
9065	sein	v	-0.001960
9066	haben	v	-0.002216

9067 rows × 3 columns

D(w) = sentiment score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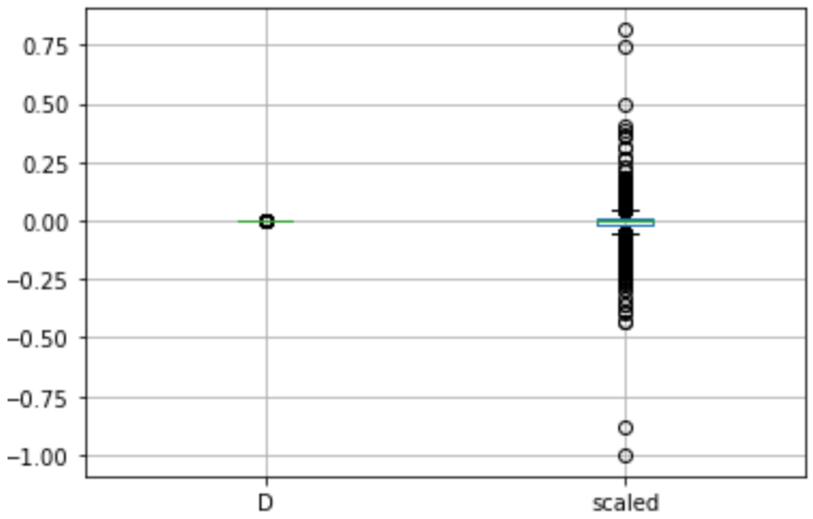
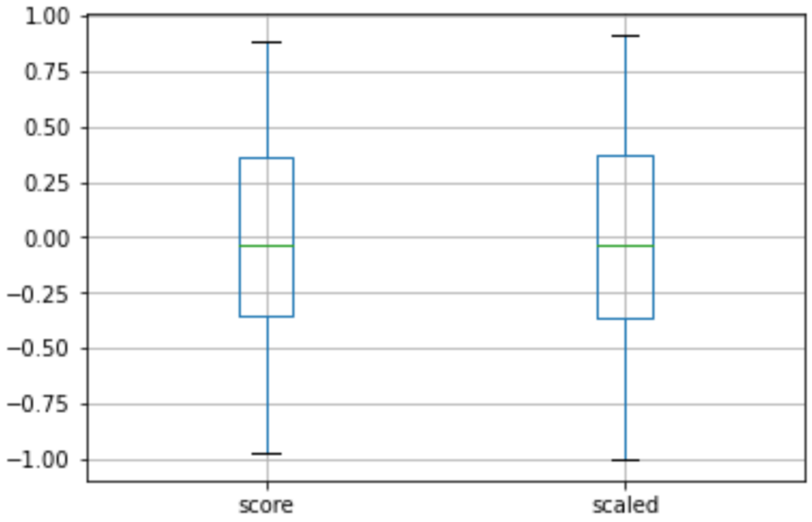
Methods: Postprocessing (1)

Scaling to [-1,+1] with „max_abs_scaler of sklearn“[1] before merging the dictionaries

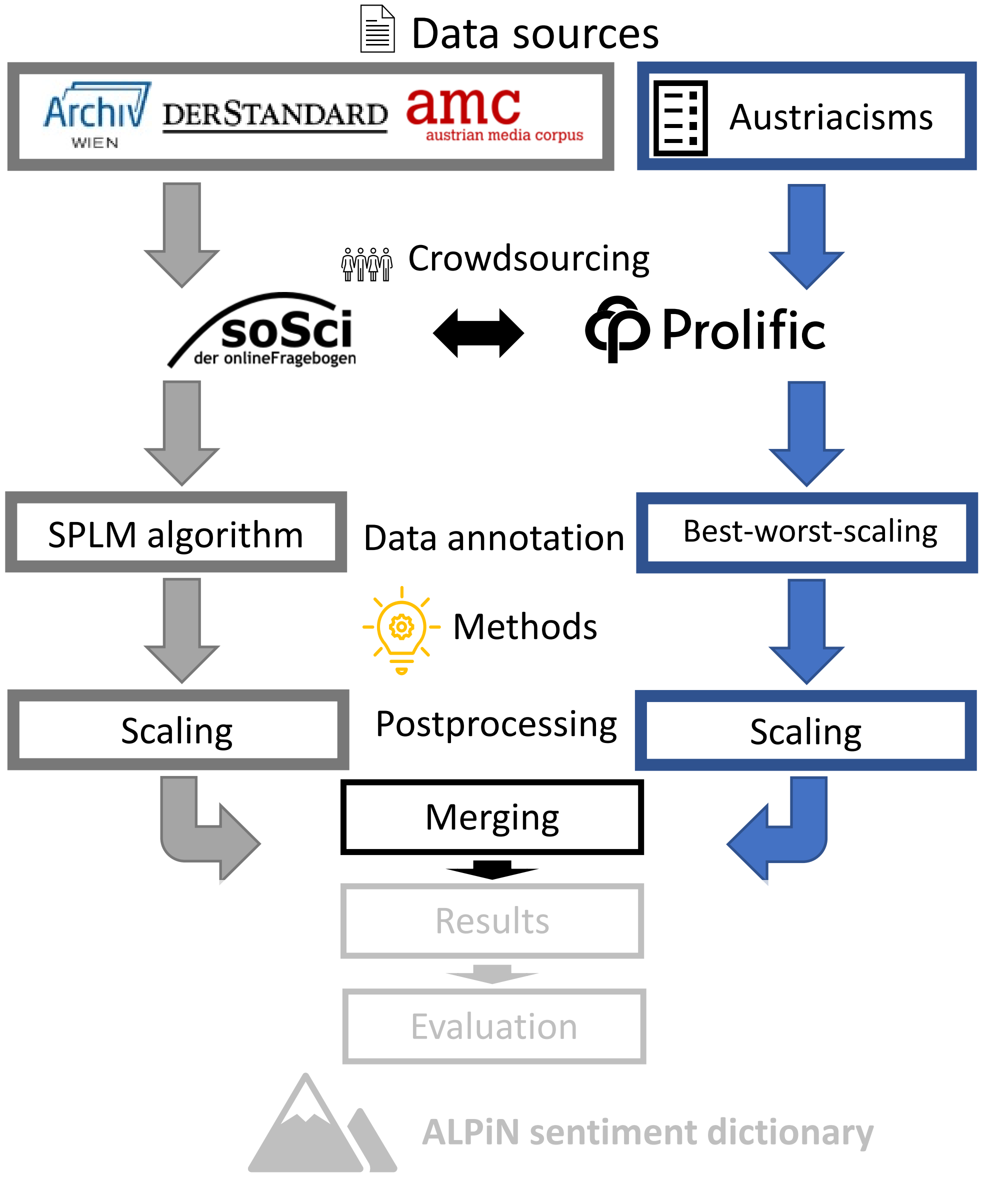


amc with derStandard after applying SPLM



Austriacisms after applying BWS

1. https://scikit-learn.org/stable/modules/generated/sklearn.preprocessing.MaxAbsScaler.html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Methods: Postprocessing (2)

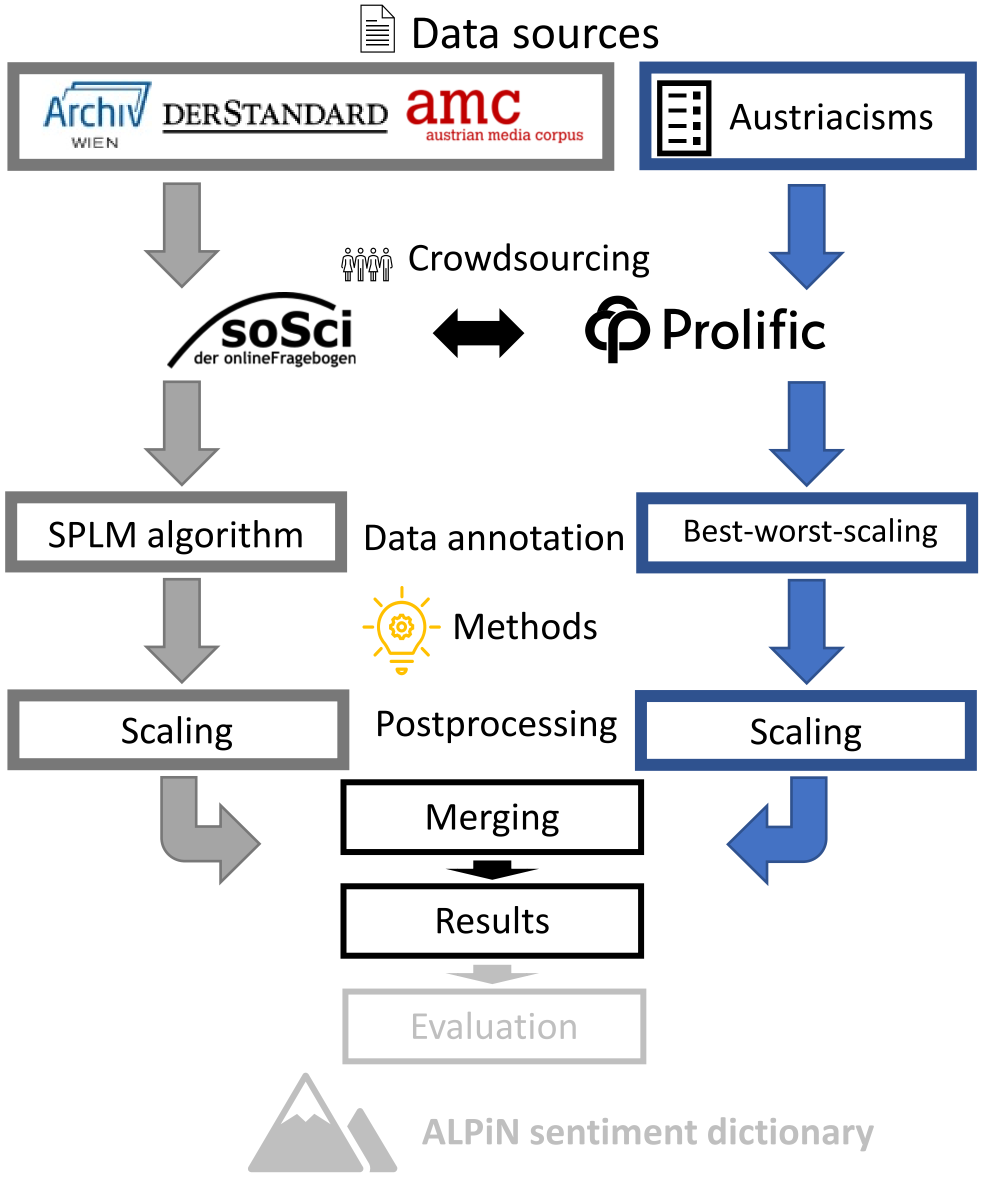
Comparison of words which occur in both dictionaries (amc+derStandard vs austriacisms):

	word	short-tag	sentiment_austriazism	sentiment_dysen_with_derstandard
0	Wiese	n	0.750258	0.011685
1	Karenz	n	0.742002	0.017528
2	Angelobung	n	0.728586	-0.021754
3	Ehrenzeichen	n	0.710010	0.029213
4	Gehalt	n	0.644995	0.091790
5	aufrecht	a	0.625387	-0.013376
6	maturieren	v	0.625387	0.011685
7	ÖAMTC	n	0.562436	-0.013376
8	einbringen	v	0.547988	-0.052732
9	Team	n	0.515996	0.072572

20	Abgang	n	0.000000	-0.033439
21	Klappe	n	-0.226006	-0.013376
22	klagen	v	-0.312693	-0.023445
23	angreifen	v	-0.343653	-0.001765
24	Fleck	n	-0.375645	-0.013376
25	Einvernahme	n	-0.386997	-0.013376
26	Freunderlwirtschaft	n	-0.437564	-0.013376
27	versperren	v	-0.486068	-0.013376
28	Mist	n	-0.594427	-0.013376
29	sekkieren	v	-0.688338	-0.013376
30	exekutieren	v	-0.837977	-0.001691
31	Exekution	n	-0.875129	0.011685

Restrictions:

During merging duplicates will be removed by using the Austriacism words prioritized.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Results

amc data only

	word	Tag	D
0	neu	a	0.002108
1	Wien	n	0.002040
2	Wiener	a	0.001465
3	Jahr	n	0.001432
4	Michael	n	0.001307
...	...	...	...
4863	Pilz	n	-0.001522
4864	Westenthaler	n	-0.001664
4865	Peter	n	-0.001664
4866	sein	v	-0.002586
4867	haben	v	-0.003756

4868 rows × 3 columns

amc with derStandard

	word	Tag	D
0	auch	r	0.001807
1	ich	n	0.001656
2	sehr	r	0.001095
3	geben	v	0.000894
4	Frau	n	0.000864
...	...	...	...
9062	nur	r	-0.000872
9063	Flüchtling	n	-0.000949
9064	hier	r	-0.000961
9065	sein	v	-0.001960
9066	haben	v	-0.002216

9067 rows × 3 columns

Results

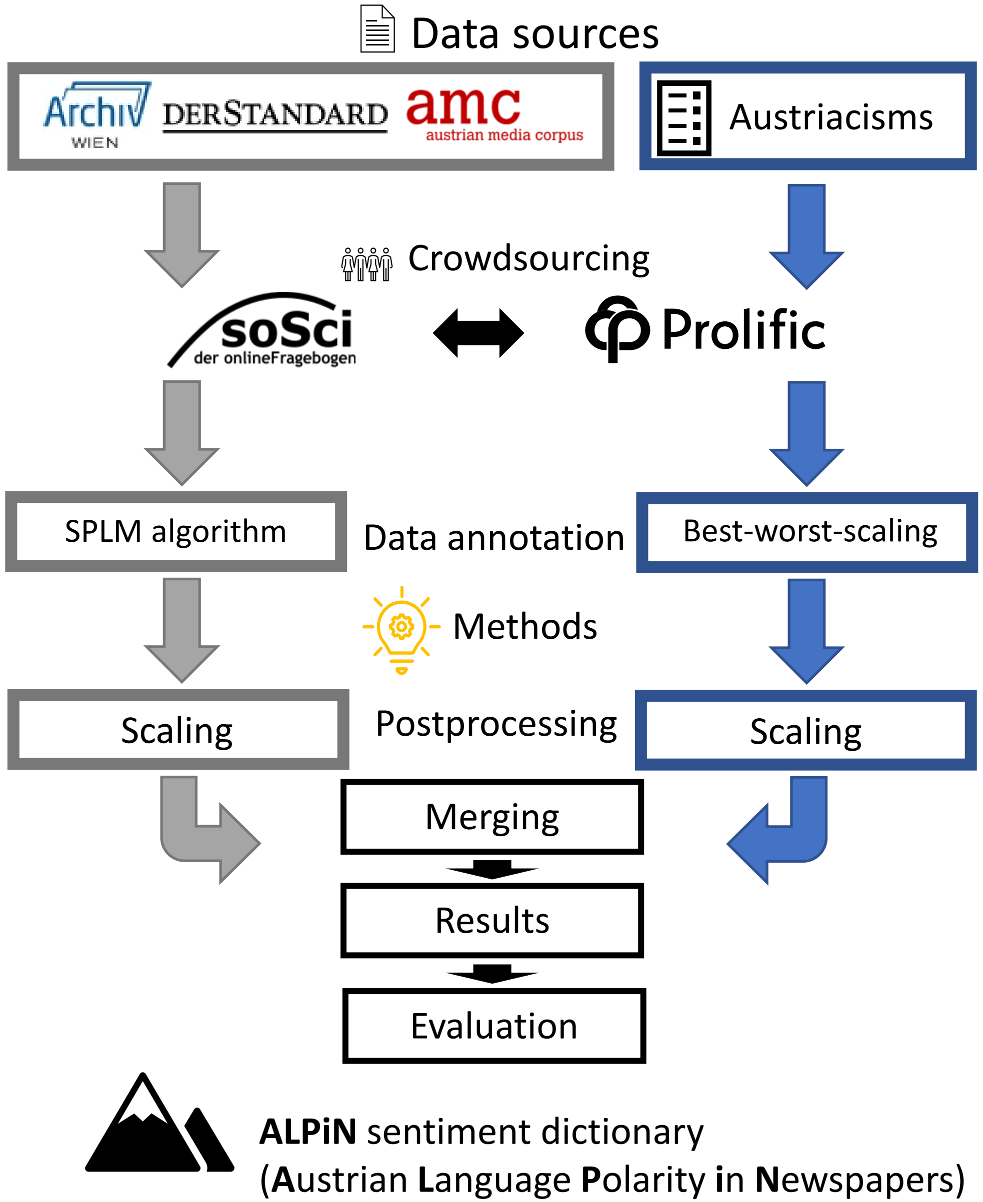
amc + derStandard + austriacisms

Scaled to [-1,+1] with „max_abs_scaler of sklearn“[1]

	word	short-tag	scaled
0	fesch	a	0.910217
1	Zuckerl	n	0.907121
2	Topfenpalatschinke	n	0.884417
3	leiwand	a	0.880289
4	Ersparnis	n	0.871001
...	...	...	...
9568	sein	v	-0.884468
9569	speiben	v	-0.902993
9570	Brandleger	n	-0.907121
9571	Fotze	n	-1.000000
9572	haben	v	-1.000000

9573 rows × 3 columns

1. https://scikit-learn.org/stable/modules/generated/sklearn.preprocessing.MaxAbsScaler.html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(Austrian Language Polarity in Newspapers)

Evaluation (1)

Method: Kfold (5 folds), cross_validation, SVC(kernel=‘linear‘)

Features:

- Count of positive words in text-item
- Count of negative words in text-item
- proportion

	text	polarity	count_pos	count_neg	proportion
0	[(qualifizieren, a), (Leute, n), (verdienen, v...	positive	5	0	5.000000
1	[(Gott, n), (ich, n), (Umfrage, n), (alle, n),...	negative	7	2	3.500000
2	[(FPÖ, n), (Rohr, n), (schießen, v), (Regierun...	positive	5	6	0.833333
3	[(ich, n), (Leute, n), (verständlicherweise, r...	negative	6	4	1.500000
4	[(wer, n), (weis, n), (was, n), (da, r), (vorf...	positive	3	2	1.500000

dataset after feature calculation

Evaluation (2)

Evaluate the dictionary which is based on amc, derStandard and the austriacism list against "derStandard" and "DYSEN“:

1st against derStandard only

```
fit_time 0.70582594871521
score_time 0.03183770179748535
test_accuracy 0.7532595425745635
test_precision 0.7655951442582838
test_recall 0.7740803341990627
test_f1_score 0.7688922021025179
```

2nd against amc only

```
fit_time 0.17100081443786622
score_time 0.01651768684387207
test_accuracy 0.8150271692254615
test_precision 0.8322847276249622
test_recall 0.8117444005270092
test_f1_score 0.8186862563698238
```

Discussion (1)

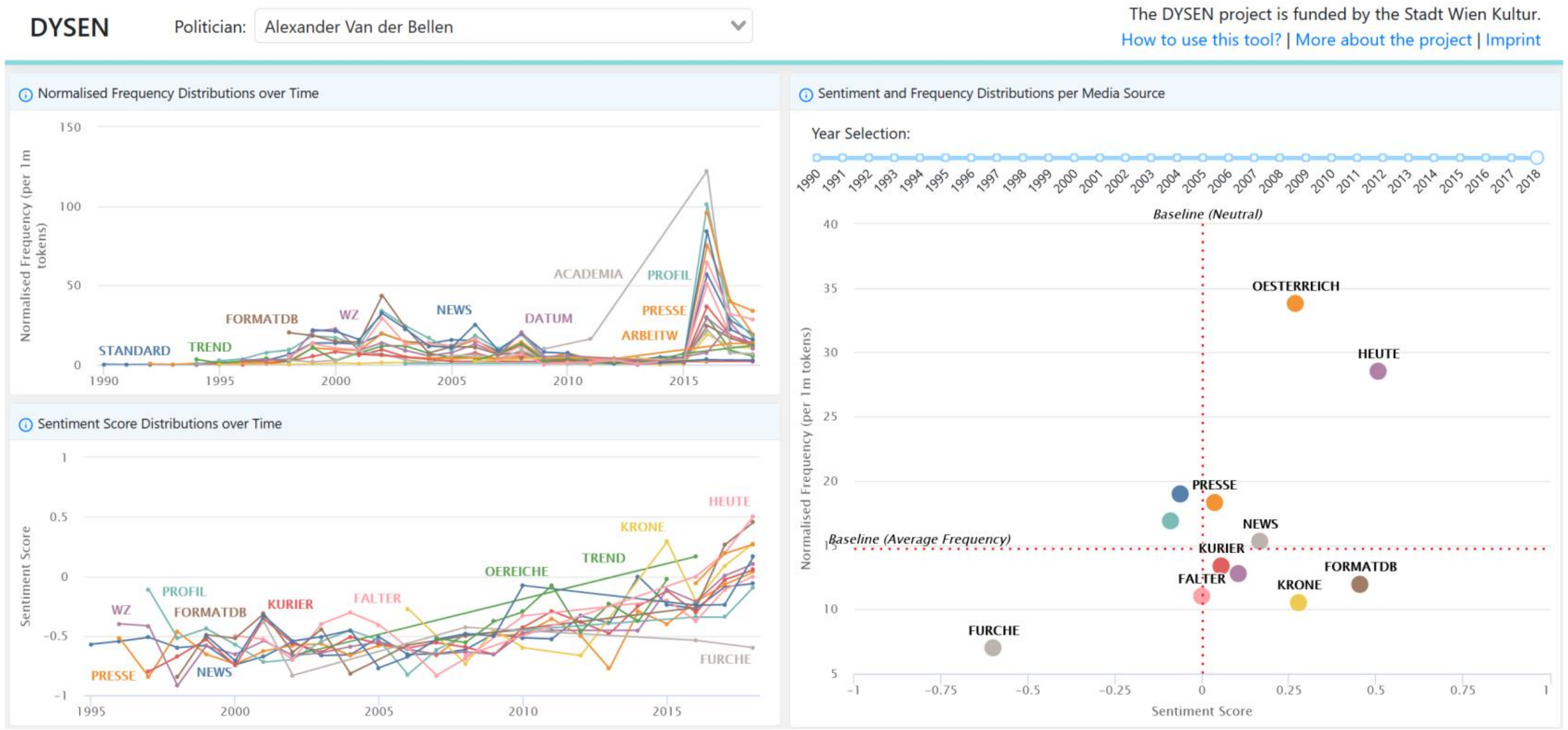
- Difficult to label news media (mainly “neutral” texts), as a result the inter-annotator agreement is not as high as in other domains by using similar methods
- Limited text length
- No external dataset for evaluation

Future work:

- Improvement of the text extraction by using Aspect-based sentiment analysis
- Investing more money to label a bigger dataset
- Expanding the scope of the project to all politicians and media in Austria

Discussion (2)

Tool created as part of the DYSEN project which uses the ALPiN dict.:



https://dysen-tool.acdh-dev.oeaw.ac.at/ (work in progress)

ALPiN Dictionary (1)

„Austrian Language Polarity in Politics and Newspapers“

- Current research topic in our DYSEN project
- Currently there is no dictionary based on Austrian-German in the domain of news media and politics
- amc austrian media corpus: Based on the „Austrian Media Corpus“ phrases related to Viennese politicians of the last 20 years
- Labelled dataset created via crowd-sourcing (prolific) by Austrian German native speakers
- Dictionary generated by applying the SPLM (Almatarneh & Gamallo, 2018) algorithm

ALPiN Dictionary (2)

„Austrian Language Polarity in Politics and Newspapers"

- Incorporation of Austriacisms by using the best-worst-scaling (BWS) to improve the quality of the labels (Kiritchenko & Mohammad, 2017)

DERSTANDARD

- Incorporation of derStandard (popular Austrian news media) forum posts
- Diverse independent data-sources (amc, derStandard, austriacisms)
- Resulting resource and paper will be submitted/published by the end of the year

Thank you very much!

thomas.kolb@tuwien.ac.at

Funded by:

Stadt Wien

Grant number: MA7-737909/19

ÖAW ÖSTERREICHISCHE AKADEMIE DER WISSENSCHAFTEN

universität wien

TU WIEN TECHNISCHE UNIVERSITÄT WIEN

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