

A New Sentiment Lexicon for Student Evaluation of Teaching Text Data

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Introduction

- Student evaluation of teaching (SET) is important.
- Analysis of SET data typically focuses on numerical rating scores but neglects the qualitative data (i.e., text comments).
- Text comments can provide more and valuable information

An Example

He was very nice, and he had a huge passion for what he was do, which I admire. But, his team homework and exam were close to impossible. I went into a test feel prepare and ready, and came out of the test feel horrible and knew I fail. I think he expect too much of his student sometime. But he is an overall nice guy.

**The research question is how to determine the
overall and aspects sentiments of the text
comment.**



Dictionary based sentiment analysis

- A pre-defined dictionary with sentiment expressions and sentiment score.
- Identify the sentiment expressions in a text and calculate the sentiment score.
- Develop a dictionary for SET.
- Overall sentiment and aspect sentiment.



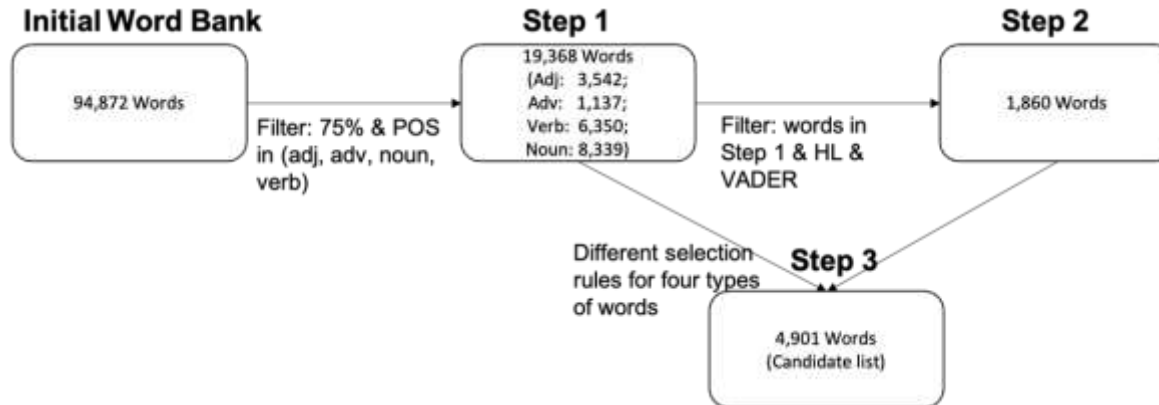
Terminology

The **class** was well **organized**, and the **professor** was **knowledgeable**.

- **Sentiment expression**: a word that expresses the sentiment of text
- Aspect categories
- **Aspect expression**: a word that describes the attribute in the text



Sentiment expressions



- Sources of expressions
 - 11 million comments
 - VADER
 - Hu-Liu Opinion Lexicon
- 4,901 expressions



Sentiment scoring

What are the appropriate sentiment scores that you think *most other people* would choose for these 20 words in the *higher education Teaching Evaluation* context?

Please note NOT every word has a opinion direction (it can be consider as Neutral 0).

And if it is misspelled, please rate it as its correct version.

Thank you very much for your time and input!

Select an option

1. S{V1}

- ✓ (Please select)
- Extremely Positive +4
- Very Positive +3
- Positive +2
- Slightly Positive +1
- Neutral 0
- Slightly Negative -1
- Negative -2
- Very Negative -3
- Extremely Negative -4
- N/A





Building SentiSET lexicon

- 3,852 sentiment words and 46 degree words.
- Invariant across gender, race and age.

Sentiment Word	Pos	Sentiment score
asleep	adj	-0.22
optional	adj	0.56
brilliance	noun	3.00
brighten	verb	2.75

Degree Word (adv)	Intensity level
slightly	0.5
rather	0.8
remarkably	1.3
totally	1.5



Aspects of teaching evaluation: instructor, workload, relationship

Comment 1: Please read the comment for at least 10 seconds and think about the sentiment that implies.

Prof is a great but tough professor. He explains concepts very well and relates some of the stuff to real-life stuff in industry and pharmacy. He is also quite funny at times and is a great professor to talk to. Very helpful. Exams are fair and cover stuff said in lectures; no surprises. Definitely take him over other professors.

1.1 What kinds of information you can gather from this comment? (check one or more)

- ☐ Personal opinion about the teacher/class
- ☐ Course requirement
- ☐ Comparison with other courses
- ☐ Comparison with other comments
- ☐ None of these

1.2 Please choose the **overall sentiment** of the comment.

Overall Sentiment

2.1 In this comment, what do you think is the sentiment level of each topic? If you believe the comment does **NOT** involve certain topics, please check **not applicable**.

Instructor

Workload

Relationship

2.2 How much content in the comment is related to each topic?

Instructor

Workload

Relationship

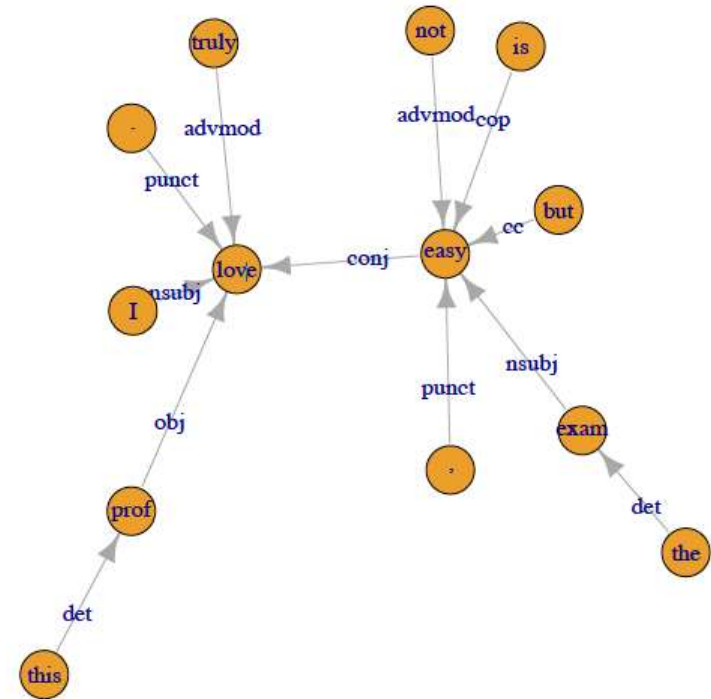
3.1 Please select the keywords/keyphrases for the **INSTRUCTOR** topic in the following comment.

Prof is a great but tough professor. He explains concepts very well and relates some of the stuff to real-life stuff in industry and pharmacy. He is also quite funny at times and is a great professor to talk to. Very helpful. Exams are fair and cover stuff said in lectures; no surprises. Definitely take him over other professors.



Sentiment of a text – parse text

1. Parse data.
2. Identify sentiment expressions and aspects.
3. Score.



- Example: I truly love this prof, but the exam is not easy.



Sentiment of a text – scoring

doc_id	sentence_id	token_id	token	pos	head_token_id	dep_rel	SV	A	MV	NV
1	1	1	I	pron	3	nsubj	-	-	-	-
1	1	2	truly	adv	3	advmod	-	-	1.5	-
1	1	3	love	verb	0	root	3.08	3	-	-
1	1	4	this	det	5	det	-	-	-	-
1	1	5	prof	noun	3	obj	-	1	-	-
1	1	6	,	punct	12	punct	-	-	-	-
1	1	7	but	cconj	12	cc	-	-	-	-
1	1	8	the	det	9	det	-	-	-	-
1	1	9	exam	noun	12	nsubj	-	2	-	-
1	1	10	be	aux	12	cop	-	-	-	-
1	1	11	not	part	12	advmod	-	-	-	1
1	1	12	easy	adj	3	conj	1.56	-	-	-
1	1	13	.	punct	3	punct	-	-	-	-

SV: sentiment value for
sentiment word

MV: modifier value for degree
word

NV: negation value

A: aspect category



Sentiment of a text – scoring (Cont'd)

Results:

Instructor: 4.62

Workload: -1.56

Relationship: 4.62

Overall: positive (3.06)

doc_id	sentence_id	token_id	token	pos	head_token_id	dep_rel	SV	A	MV	NV	AES
1	1	2	truly	adv	3	advmod	-	-	1.5	-	
1	1	3	love	verb	0	root	4.62	3	-	-	4.62
1	1	5	prof	noun	3	obj	-	1	-	-	4.62
1	1	9	exam	noun	12	nsubj	-	2	-	-	-1.56
1	1	11	not	part	12	advmod	-	-	-	1	
1	1	12	easy	adj	3	conj	-1.56	-	-	-	

Another example

“He was very nice, and he had a huge passion for what he was do, which I admire. But, his team homework and exam were close to impossible. I went into a test feel prepare and ready, and came out of the test feel horrible and knew I fail. I think he expect too much of his student sometime. But he is an overall nice guy.”

*Overall sentiment:
positive (7.1)*

Aspect Sentiment
Score

Instructor: 7.91

Workload: -2.12

Relationship: 0

Key Info

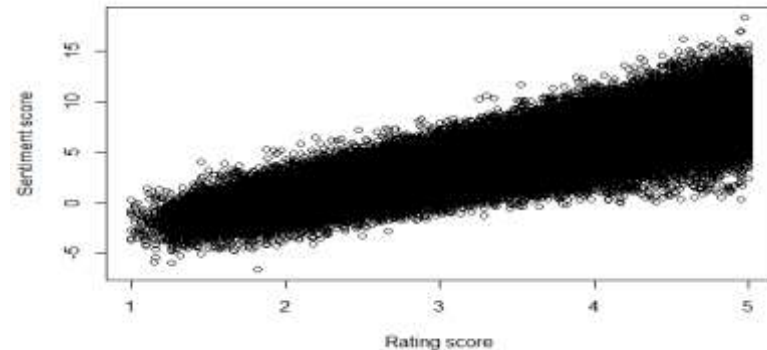
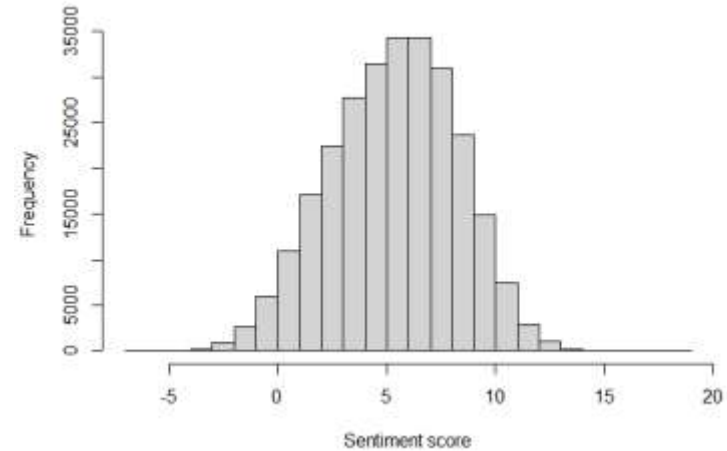
Instructor: *very nice;
passion*

Workload:
*homework exam
close impossible*

Relationship: *N/A*

Sentiment score of real data

- 269039 college instructors.
- Largely positive sentiment.



Evaluation

Lexicon	Cor with annotation data	Recall	Precision	F1
SentiSET	0.71	0.79	0.98	0.87
sentimentr+jokers-rinker*	0.69	0.80	0.96	0.87
AFINN	0.62	0.78	0.92	0.85
VADER	0.59	0.73	0.96	0.83
HL	0.62	0.80	0.95	0.87
Jokers	0.59	0.72	0.96	0.82
SentiWord	0.38	0.67	0.98	0.80

	M_O	M_A1	M_A2	M_A3
M_O	–			
M_A1	0.74	–		
M_A2	0.53	0.30	–	
M_A3	0.43	0.29	0.17	–

	R_O	R_A1	R_A2	R_A3
R_O	–			
R_A1	0.92	–		
R_A2	0.78	0.73	–	
R_A3	0.84	0.85	0.68	–



Summary

- A domain specific sentiment lexicon SentiSET for teaching evaluation.
- A list of aspect expressions for SET
- A novel ABSA model for SET domain
- An annotation dataset for the sentiment analysis research community

Next

- R package for text analysis based on the lexicon.
- Compare to machine learning methods.
- Sub-aspect related to teaching evaluation.



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THANKS!

Any questions?

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