



University of Stuttgart
Institute for
Natural Language Processing

Annotation, Modelling, Analysis of Fine-Grained Emotions on a Stance and Sentiment Detection Corpus

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Hendrik Schuff, Jeremy Barnes,
Julian Mohme, Sebastian Padó,
Roman Klinger



Motivation



The Riddling Rhymer

@Dr_Riddle_Rhyme

Folgen



Why criticise religions? If a path is not your own. Don't be pretentious. And get down from your throne. [#religion](#) [#peace](#)
[#worldpeace](#)

🌐 Original (Englisch) übersetzen

22:11 - 25. Juni 2015



Which emotions are expressed?

Anger
XXXX

Anticipation
XX

Disgust
X

Fear

Joy
X

Sadness
X

Surprise

Trust
X

(Self-labeling typically does not discover such cases!)

Outline

- 1 Motivation
- 2 Annotation Process and Analysis
- 3 Baseline Models

What is Emotion Analysis?

Sentiment analysis

positive vs. negative
(neutral, mixed)

Subjectivity analysis

subjective vs. objective

Emotion analysis discrete (Ekman/Plutchik)

discrete emotion classes

Emotion analysis continuous (Posner/Russell/Peterson)

valence and arousal

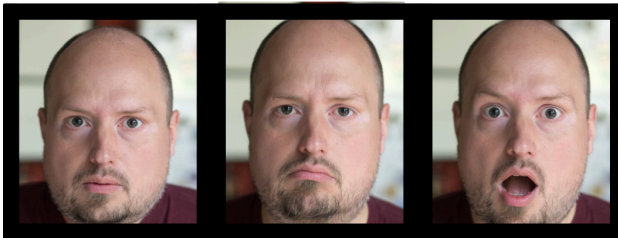
Emotion Models: Ekman



Joy

Anger

Disgust

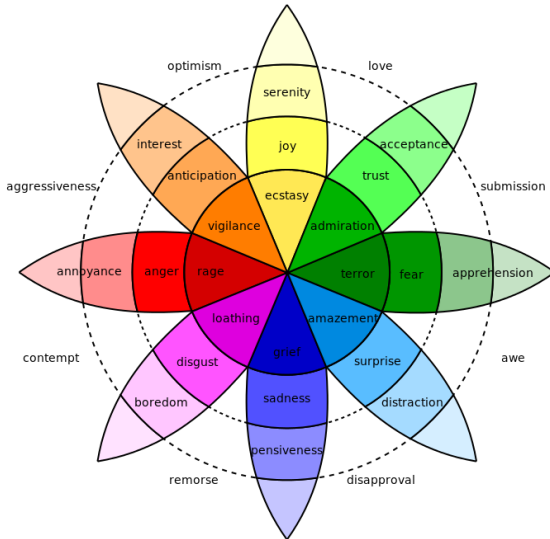


Fear

Sadness

Surprise

Emotion Models: Plutchik's Wheel



- Anger
- Anticipation
- Disgust
- Fear
- Joy
- Sadness
- Surprise
- Trust

Previous Work and State of the Art

Name	Data	Size	Domain
STS-test	tweets	498	General
SemEval 2013	tweets	15,196	General
Healthcare Reform	tweets	2,516	Politics
Obama-McCain Debate	tweets	3,238	Politics
Dialogue Earth	tweets	26,110	Weather/Gas
STS-GOLD	tweets	2,205	General
SemEval 2016	tweets	4,870	5 topics
Sentiment Strength	tweets	4,242	General
ISEAR	descriptions	7,666	Events
Tales	sentences	1,580	Fairytales
Blogs	blogs	173	General
SemEval 2017	headlines	1,250	General
WASSA EmotInt 2017	tweets	7,102	General
Electoral Tweets	tweets	965	Elections

⇒ **No manually annotated multi-label emotion corpus of Tweets available.**

(References are in the paper)

Task Description and Research Question

Corpus Generation Task

- Tweets
- Publicly available
- Multiple annotators
- Multi-label
- (Additional annotation layers available)

Research Questions

- What's the inter-annotator agreement?
- Which annotation layers interact?
- How well is it possible to computationally estimate such annotations?

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Annotation Process

Corpus

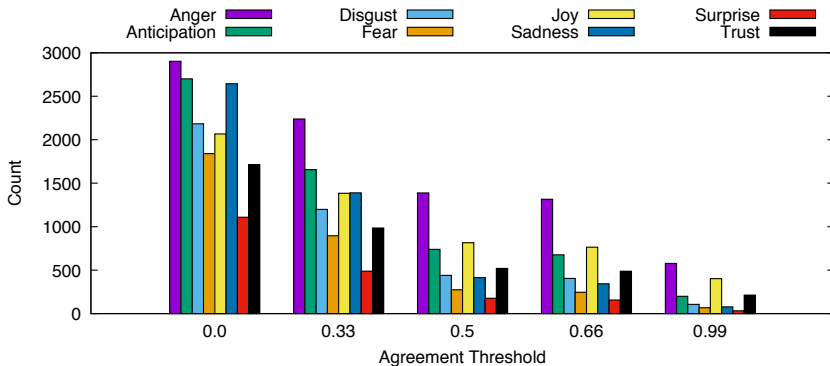
- Annotation of SemEval 2016 Twitter Corpus
 - Stance and sentiment annotations exist
 - Established corpus
 - 4,870 Tweets (from which we use 4,868 Tweets)

Annotators

- Six annotators finished their annotations
- Minimum number of annotations per Tweet is three
- 2776 Tweets annotated by four annotators
- Undergraduate students of media-informatics
- German native speakers, college-level knowledge of English
- Training of annotators based on another set of Tweets



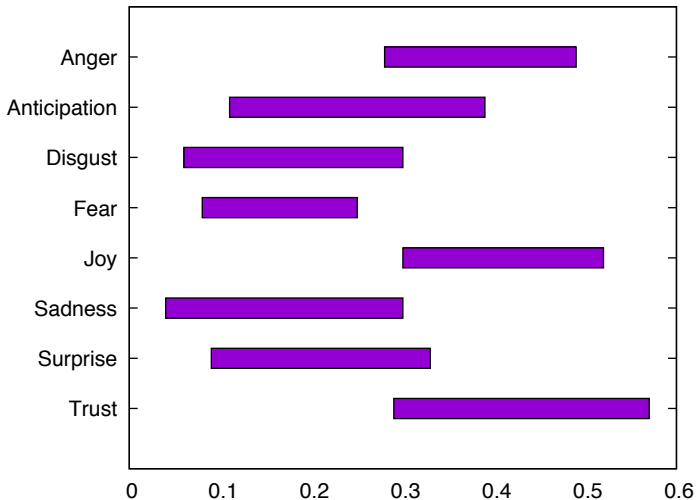
Label Counts



- ⇒ Seldom that all annotators agree
- ⇒ Some classes are more difficult (Anticipation, Disgust, Fear, Sadness, Surprise) than others (Anger, Joy, Trust)
- ⇒ Low number of majority vote annotations
- ⇒ Low quality of annotation combination?

Inter-annotator Agreement

Range of pairwise agreement between all annotation pairs



Difficult Examples (1)



Amanda
@Euringer

Folgen



That moment when Canadians realised global warming doesn't equal a tropical vacation **#BCwildfire #Canadaburns #globalwarming**

🌐 Original (Englisch) übersetzen

17:59 - 7. Juli 2015

Anger	Anticipation	Disgust	Fear	Joy	Sadness	Surprise	Trust
> 0.33					> 0.33	> 0.33	

Difficult Examples (2)

“2 pretty sisters are dancing with cancered kid”



Anger

Anticipation

Disgust

Fear
> 0.0

Joy
> 0.0

Sadness
> 0.0

Surprise

Trust
> 0.0

Cooccurrences of Labels, t=0

	Emotions								Sentiment			Stance		
	Anger	Anticipation	Disgust	Fear	Joy	Sadness	Surprise	Trust	Positive	Negative	Neutral	In Favor	Against	None
Anger	2902	1437	1983	1339	774	2065	711	640	275	2534	93	630	1628	644
Anticipation		2700	1016	1029	1330	1369	482	1234	1094	1445	161	772	1291	637
Disgust			2183	1024	512	1628	526	404	126	2008	49	429	1291	463
Fear				1840	466	1445	407	497	306	1445	89	448	982	410
Joy					2067	682	438	1101	1206	750	111	596	952	519
Sadness						2644	664	613	345	2171	128	604	1429	611
Surprise							1108	222	219	801	88	257	521	330
Trust								1713	1082	558	73	500	860	353
Positive									1524	0	0	485	673	366
Negative										3032	0	622	1665	745
Neutral											312	97	71	144
In Favor												1204	0	0
Against													2409	0
None														1255

- Many cooccurrences as expected (pos w/ pos, neg w/ neg) Positive Anger Negative Joy Positive Disgust

Examples

Positive Anger

“Lets take back our country! Whos with me? No more Democrats!2016”

“Why criticise religions? If a path is not your own. Don't be pretentious. And get down from your throne.”

Negative Joy

“Global Warming! Global Warming! Global Warming! Oh wait, it's summer.”

“I love the smell of Hillary in the morning. It smells like Republican Victory.”

Positive Disgust

“#WeNeedFeminism because #NoMeansNo it doesnt mean yes, it doesnt mean try harder!”

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Models, Experimental Setting

MaxEnt, Linear SVM

- Bag-of-Words

LSTM, BiLSTM

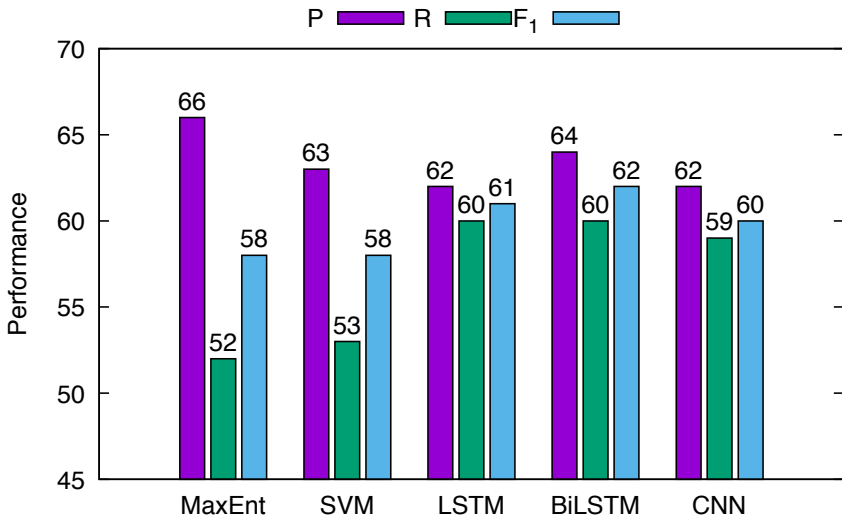
- 300 dimensional embedding
- 175 dimensional LSTM layer, 0.5 dropout rate
- 50 dimensional dense layer
- 8 output neurons

CNN

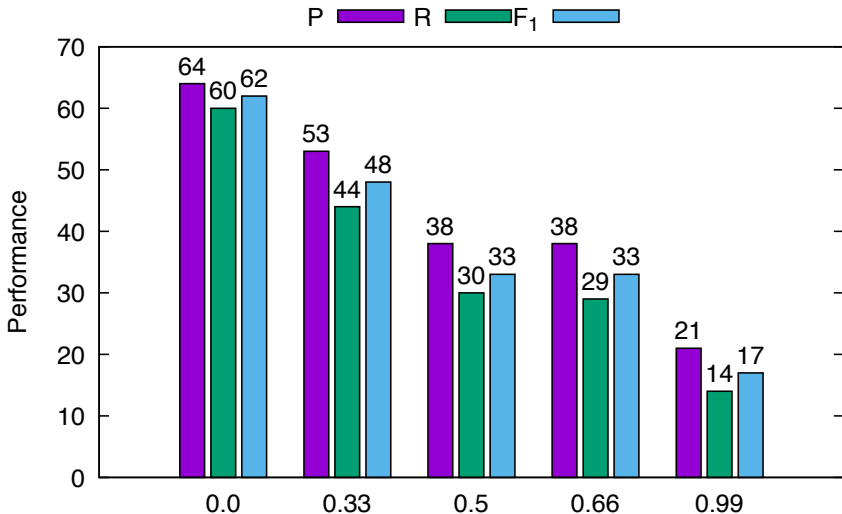
- Convolution of window size 2,3,4
- Pooling of length 2

(Twitter specific embeddings are used.)

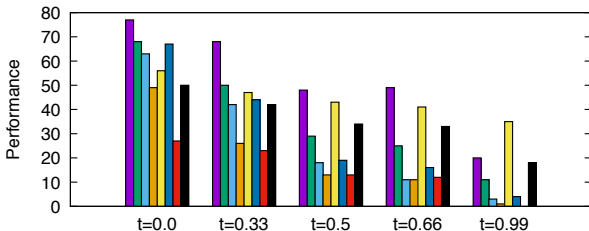
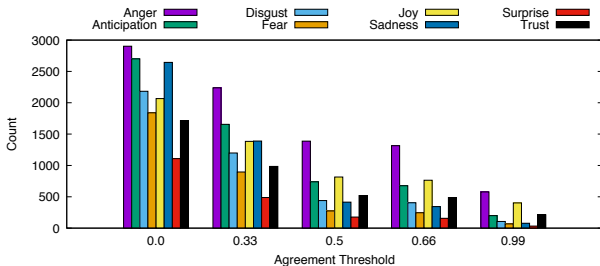
Models for t=0.0



Annotation Aggregation Methods: BiLSTM



Performance vs. Frequency



Conclusion and Summary

- Multi-label emotion annotation is a challenging task
- We publish all annotations
- Aggregation by disjunction leads to annotation which can better be modeled computationally
- Linear and neural models perform similarly well

Future Work

- Develop models which take into account label interactions explicitly
- Deeper linguistic analysis of annotation properties

Availability

`www.ims.uni-stuttgart.de/data/ssec`

Thank you!

Availability

`www.ims.uni-stuttgart.de/data/ssec`

Position available in my group at Uni Stuttgart!

Ph.D. student or PostDoc in project

“Structured Multi-Domain Emotion Analysis from Text”