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An Impact Analysis of Features in a Classification Approach to Irony Detection in Product Reviews

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Slides are available at http://www.roman-klinger.de/talks/irony.pdf
Introduction
What is Irony?

Merriam Webster Dictionary, 2014 (excerpt)

- “the use of words that mean the opposite of what you really think especially in order to be funny” (verbal irony)
  - “the use of words to express something other than and especially the opposite of the literal meaning”
- “a situation that is strange or funny because things happen in a way that seems to be the opposite of what you expected” (situational irony)
  - “incongruity between the actual result of a sequence of events and the normal or expected result”
“Thanks that you took care of the dirty dishes.”
“He might be upset.”
Introduction
What is Irony? – Examples (4)
Introduction

What is sarcasm?

Merriam Webster Dictionary, 2014 (excerpt)

■ “a sharp and often satirical or ironic utterance designed to cut or give pain”
S. Attardo (2000). “Irony Markers and Functions: Towards a Goal-oriented Theory of Irony and its Processing”. In: *Rask: Internationalt Tidsskrift for Sprog og Kommunikation*

**Irony factors**

⇒ …are essential for irony to happen

**Irony markers**

⇒ …are marking the occurrence in irony

- Irony can happen without markers!
Introduction

Irony in product reviews (1)

From a review for a movie

- “Read the book!”

From a review for a book

- “I would recommend this book to friends who have insomnia or those who I absolutely despise.”

Ironic Environment

A. Utsumi (2000). “Verbal irony as implicit display of ironic environment: Distinguishing ironic utterances from non-irony”. In: Journal of Pragmatics
“... Pros: Fits my girthy frame, has wolves on it, attracts women
Cons: Only 3 wolves [...], cannot see wolves when sitting with arms
crossed, wolves would have been better if they glowed in the dark.”
Introduction Examples (3)

Hello Kitty Kotbeutel rosa/weiß, 3 Rollen
von Hello Kitty

Preis: EUR 6,95 (EUR 2,32 / Stück)
Alle Preisangaben inkl. MwSt.

Nur noch 1 auf Lager

Verkauf und Versand durch Lauf-Kundschaft. Für weitere Informationen, Impressum, AGB und Widerrufsrecht klicken Sie bitte auf den Verkäufernamen.

- Ersatzkotbeutel aus besonders festem Material
- Großer Beutel
- Besonderes Design
- Kotbeutel leicht parfumiert

Für eine größere Ansicht klicken Sie auf das Bild
Introduction

Examples (4)
Error reduction by sarcasm detection in polarity detection of tweets

D. Maynard et al. (2014). “Who cares about Sarcastic Tweets? Investigating the Impact of Sarcasm on Sentiment Analysis.” In: LREC

Supports understanding of irony in language

It is fun.
Introduction

Previous Work – Definitions of Irony

- A. Utsumi (2000). “Verbal irony as implicit display of ironic environment: Distinguishing ironic utterances from nonirony”. In: Journal of Pragmatics
- D. Wilson et al. (2012). “Explaining Irony”. In: Meaning and Relevance
- H. H. Clark et al. (1984). “On the pretense theory of irony.” In: Journal of Experimental Psychology: General
- S. Kumon-Nakamura et al. (1995). “How About Another Piece of Pie: The Allusional Pretense Theory of Discourse Irony”. In: Journal of Experimental Psychology: General
Introduction

Previous Work – Automatically Detecting Irony (excerpt)

- Feature Impact analysis in Twitter
  F. Barbieri et al. (2014). “Modelling Irony in Twitter: Feature Analysis and Evaluation”. In: LREC
  A. Reyes et al. (2011). “Mining subjective knowledge from customer reviews: a specific case of irony detection”. In: WASSA@ACL
  R. González-Ibáñez et al. (2011). “Identifying sarcasm in Twitter: a closer look”. In: ACL-HLT

- Google book search for specific phrases, automated classification
  M. L. Dress et al. (2008). “Regional Variation in the Use of Sarcasm”. In: Journal of Language and Social Psychology

- Portuguese Newspaper comments, specific features
  P. Carvalho et al. (2009). “Clues for detecting irony in user-generated contents: oh...!! it’s “so easy” ;-)”. In: TSA@CIKM

- Amazon review sentences, KNN, rich feature set
  O. Tsur et al. (2010). “ICWSM – A Great Catchy Name: Semi-Supervised Recognition of Sarcastic Sentences in Online Product Reviews.” In: ICWSM
Amazon Corpus published

E. Filatova (2012). “Irony and Sarcasm: Corpus Generation and Analysis Using Crowdsourcing”. In: LREC

Amazon Mechanical Turk Annotation of Corpus

1\textsuperscript{st} step: Selection of an ironic and a regular review for a product each, submission of review ID

2\textsuperscript{nd} step: Validation of annotation by 5 additional turkers, kept in corpus when majority agreed

Additional information was extracted not taken into account in this work

437 ironic, 817 regular reviews, 1254 altogether

sarcasm $\equiv$ verbal irony
Supervised classification problem
Each review categorized into being ironic or non-ironic
Corpus by Filatova, 2012 used
Classifiers taken into account:
- Naïve Bayes, support vector machine (with linear kernel), logistic regression, decision tree, random forest
- As implemented in Python library scikit-learn
Method

Problem Specific Features

Imbalance

- Star-rating is positive, more negative words (142/35) *
- Star-rating is negative, more positive words (0/0)

Example

★★★★★
Avoid that TV show. Highly addictive.

* (ironic reviews with that feature/non-ironic reviews with that feature)
Method

Problem Specific Features

Hyperbole

- Three successive positive words (2/4)
- Three successive negative words (4/4)

Example

That is the best, awesome, greatest, washing machine ever!
Method

Problem Specific Features

Quotes

- Two succeeding positive adjectives/nouns in quotes (25/25)
- Two succeeding negative adjectives/nouns in quotes (16/15)

Example

They advertise it as “very good”.

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Method
Problem Specific Features

Pos/Neg and Punctuation
- Positive word, exclamation mark in a distance of four (7/19)
- Negative word, exclamation mark in a distance of four (4/2)

Example
Such a great thing!
Method
Problem Specific Features

Pos/Neg and Ellipsis

- **Positive** word, ellipsis in a distance of four (27/33)
- **Negative** word, ellipsis in a distance of four (28/18)

Example

Such a great thing...
Ellipsis and Punctuations

- An ellipsis is followed by multiple punctuation marks (4/1)

Example

You really say...?!?
**Method**

**Problem Specific Features**

**Punctuation**
- Existence of multiple exclamation marks (31/51)
- Existence of multiple question marks (10/6)
- Combination of question with exclamation mark (12/4)

**Example**

“!!!!”, “??”, “?!”
Method
Problem Specific Features

Interjection
- Terms like “wow” and “huh”, “lol” (16/18)

Laughter
- Onomatopoeia like “haha” (1/2)
- Smilies (6/25)

Example
That machine is really like . . .*WOW* . . . hahahaha :-)

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Method

Bag-of-Words

- Every occurring term is used to generate a feature

Features

Example text: “This is great.”
- The word “This” occurs
- The word “is” occurs
- The word “great” occurs
- ...
Experiments Outline

1. Introduction
2. Method
3. Experiments
4. Summary
Use the star-rating as five features ("star-rating")
Bag-of-Words ("BOW")
Majority of positive/negative words ("sentiment")
Experiments

Results, Logistic Regression, 10-fold CV

|                | Star-Rating | BOW   | Sentiment | All+Star-Rating | All   | Specific |
|----------------|-------------|-------|-----------|-----------------|-------|----------|
| F1             | 71.7        | 68.8  | 58.1      | 74.4            | 67.8  | 50.8     |
Experiments
Distributions

Corpus

Prediction

Number of Reviews
Stars
Corpus
Irony
Non Irony

Number of Reviews
Stars
Prediction
Irony
Non Irony
Experiments

Results for different classifiers

| Classifier    | F1  |
|---------------|-----|
| Logistic Regr.| 74.4|
| SVM           | 71.3|
| Decision Tree | 72.2|
| Random Forest | 48.2|
| Naive Bayes   | 65.0|
Experiments

Information Gain of Bag-of-Words

Which phrases are important to decide for irony?

great, I mean, easy, mean, is very, very, stupid, is a, worst, highly, a great, easy to, the worst, excellent, price, fast, a bit, shirt, works, money, man, simple, worse, use, Oh, idea, nothing, and it, How, the best, wrong
Summary

Outline

1. Introduction
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Summary

The first feature evaluation for irony detection on a publicly available corpus

Meta-information is a strong indicator

Setting with actual text based features is more useful

Outlook

Measure text similarity of reviews of same product

Transfer known theories about the use of irony to text

Include method in our fine-grained aspect/evaluation phrase extraction model for sentiment analysis (Klinger et al., 2013b; Klinger et al., 2013a)
Attardo, S. (2000). “Irony Markers and Functions: Towards a Goal-oriented Theory of Irony and its Processing”. In: Rask: Internationale Tidsskrift for Sprog og Kommunikation.

Barbieri, F. et al. (2014). “Modelling Irony in Twitter: Feature Analysis and Evaluation”. In: LREC.

Carvalho, P. et al. (2009). “Clues for detecting irony in user-generated contents: oh...!! it’s “so easy” ;-)”. In: TSA@CIKM.

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Klinger, R. et al. (2013a). “Bi-directional Inter-dependencies of Subjective Expressions and Targets and their Value for a Joint Model”. In: ACL.

— (2013b). “Joint and Pipeline Probabilistic Models for Fine-Grained Sentiment Analysis: Extracting Aspects, Subjective Phrases and their Relations”. In: ICDMW.

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