SARCASM AS CONTRAST BETWEEN A POSITIVE SENTIMENT AND NEGATIVE SITUATION

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Sarcasm: Irony/Wit to Mock, insult, or amuse

- Exists in Many Forms, Requires world Knowledge
- I’m so pleased, mom woke me up with vacuuming my room this morning!
- This paper describes a process to identify sarcasm in individual tweets of the form:
  
  **POSITIVE SENTIMENT-NEGATIVE SITUATION**
  
  love       going to the dentist
  
  Assumption: [+ VERB PHRASE] [- SITUATION PHRASE]

  Negative Situation : Undesirable states and activities
  Positive verb Phrases : love, really like, excited
**Definition:** “A self sustaining process that proceeds without external help”

- Algorithm applied learns “positive sentiments” and “negative situations” (activities or states) phrases.
Get Sarcastic Tweets → Learn Negative Situation Phrases → Learn Positive Sentiment Phrases

Seed Word: Love

- Positive Instance: 35,000 #sarcasm or #sarcastic tweets
- Negative Instance: 140,000 tweets
Get Sarcastic Tweets

Learn Negative Situation Phrases

Learn Positive Sentiment Phrases

Seed Word: Love

- Get n-grams immediately following positive sentiment phrase in sarcastic tweets
- Select candidates using POS patterns: V, V+V, V+ADV, ADV+V, “to” +V, V+NOUN, V+PRO, V+ADJ, ...
- Score candidates:
  \[ P(\text{sarcastic} | \text{-candidate follows +sentiment}) = \frac{|\text{follows(-candidate,+sentiment)} \& \text{sarcastic}|}{|\text{follows(-candidate,+sentiment)}|} \]
- Pick best: Top 20 with a probability $\geq 0.8$. 
Process

Get Sarcastic Tweets → Learn Negative Situation Phrases

Seed Word: Love → Learn Positive Sentiment Phrases

- Get n-grams that precede a negative situation phrase in sarcastic tweets
- Select candidates using POS patterns: **Verb Phrases**
- Score candidates:
  \[
P(\text{sarcastic}|\text{candidate precedes } -\text{situation}) = \frac{|\text{precedes}(+\text{candidate}, -\text{situation}) \& \text{sarcastic}|}{|\text{precedes}(+\text{candidate}, -\text{situation})|}
\]
  Pick Top 5 with a probability $\geq 0.7$
- Also select candidates using POS patterns: **Predicate patterns**

*My iphone was *stolen*. This *is* great.*
## Experiments Conducted

<table>
<thead>
<tr>
<th>Baseline</th>
<th>SVM Unigrams</th>
<th>SVM Bigrams</th>
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<tr>
<td>Classification by SVM</td>
<td>+, - Ordered</td>
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<th>Classification by Matching</th>
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<tbody>
<tr>
<td>3 Existing Sentiment Lexicons</td>
<td>+ Only</td>
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<td>New Bootstrapped Lexicons</td>
<td>- Only</td>
<td>- Only</td>
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<tr>
<th>Hybrid Classifier</th>
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<td>(Matching U SVM)</td>
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## Experimental Evaluation

Based on 3,000 test tweets (693 sarcastic by annotation)

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<tr>
<th>Experiment</th>
<th>Result Summary</th>
<th>Analysis</th>
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<tr>
<td>Supervised SVM Classifiers</td>
<td>0.39 R, 0.64 P (0.46-0.48 F)</td>
<td>Baseline</td>
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<tr>
<td>Matching w/ Positive and Negative Sentiment</td>
<td>Lower R, Lower P</td>
<td>Few sarc. examples contain both + and - matches in the 3 lexicons</td>
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<td>(from 3 lexicons), Ordered</td>
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<tr>
<td>Matching w/ Bootstrapped Lexicons</td>
<td>Low R, Higher P</td>
<td>Precision comparable to SVM when ordered</td>
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<tr>
<td>Hybrid Classifier</td>
<td>0.44 R, 0.62 P (0.50-0.51 F)</td>
<td>Contrast method classifies examples missed by SVM</td>
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</table>
Novelties and Limitations

- **Novel and Unique Features:**
  - **Novel hypothesis**: positive sentiment and negative situation patterns
  - Used a bootstrapping process to create new lexicons to identify the source of sarcasm, based on the contrast hypothesis
  - Method correctly classifies examples missed by SVM
  - Potential benefits to improve upon sentiment analysis to be explored

- **Weaknesses/Limitations/Opportunities:**
  - Consider only a particular type of sarcasm (opportunity for further research)
  - Learned phrases limited to the few patterns defined for matching
  - Not considering prior conversational context
  - Phrases constrained to short tweets, scalability to be explored
  - Need more specific negative situation lexicon (i.e. “universal stereotypes”, yet to be developed)