Sentiment Analysis in News Articles Using Sentic Computing

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Sentiment analysis for news articles
  ◦ Wide range of applications in business and public policy
  ◦ Especially relevant given the popularity of online media

Previous work
  ◦ Machine learning based on n-grams and linguistic features (Wilson et al., 2009)
Background

News articles are unusually challenging for sentiment analysis
  ◦ They attempt to remain neutral
  ◦ They require knowledge beyond superficial linguistic features

We need commonsense knowledge + affective information
  ➔ Sentic computing (Cambria & Hussain 2012)
A Sentic Approach

- Associate “sentic vectors” with commonsense concepts from ConceptNet
- Sentic vector
  - a vector describing a human emotion according to a mathematical model of emotion
- We designed an opinion mining engine to leverage sentic vectors for sentiment analysis in news articles
Our Engine

Input

- sentence

Semantic Parser

- concepts

Sentiment Analyzer

- concepts
- sentic vectors

SenticNet

Positive/Negative/Neutral
Our Engine

- **Semantic Parser**
  - Extracts commonsense concepts from sentence
  - Uses algorithm inspired by Rajagopal et al. 2013

- **SenticNet**
  - Publicly available database of emotions associated with commonsense concepts (Cambria et al. 2012)
  - Sentic vector for each concept
  - Uses Hourglass of Emotions model:
    - Pleasantness, Attention, Sensitivity, Aptitude
Our Engine

- Sentiment Analyzer
  - Obtains sentic vector for each extracted concept
  - Calculates polarity score for each concept
  - Combines polarity scores to give polarity of entire sentences
  - Handles negation
Test Data

- 3,181 sentences from the MPQA corpus (Wilson 2008)
  - Taken from large collection of world news articles
- Grouped into positive, negative and neutral classes using annotations from the corpus
# Results

- Accuracy: 71.2%

<table>
<thead>
<tr>
<th>Class</th>
<th>Precision</th>
<th>Recall</th>
<th>F-measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>46.3%</td>
<td>79.3%</td>
<td>58.5%</td>
</tr>
<tr>
<td>Negative</td>
<td>61.6%</td>
<td>70.5%</td>
<td>65.8%</td>
</tr>
<tr>
<td>Neutral</td>
<td>90.9%</td>
<td>69.8%</td>
<td>79.0%</td>
</tr>
</tbody>
</table>
Conclusions

- Reasonably high accuracy, given the difficulty of the problem

- Accurate identification of neutral sentences

- Able to catch most positive or negative sentences
Future Work

- Improve semantic parser
  - Use transformational grammar

- Identify target of emotion
  - Starting point: sentiment pattern method (Yi et al. 2003)

- Anaphora resolution
References

References