

# Learning Appraisal Extraction Patterns

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# Outline

## Sentiment Analysis

### Local Grammar Analysis

Hunston and Sinclair (2000)

### Deep Syntactic Analysis

Bloom, Garg and Argamon (2007)

### Learning Linkages

### Exploring Linkages

### Conclusions

# Sentiment Analysis

Lots of info from opinionated/evaluative language:

- Consumer product reviews
- Ideological propaganda
- Political discourse

Sentiment analysis is the field of studying opinion using computers.

# Techniques in Sentiment Analysis

- Movie review classification
  - Bag-of-words machine learning classification
  - Generally only requires opinion words/phrases.
- Opinion mining
- Predicting consumer preferences
  - Require knowledge of opinion targets

# Appraisal Expressions

Source (in Green)    Attitude (in Bold)    Target (in Blue)

- Some seem to be of the opinion that G1 was **much better** at focusing issues. . .
- Though its no substitute for a camcorder, it's a **fun** feature that has proved **useful** in my travels.
- Throughout, **we** sense the deep control which **he** so **masterfully** spreads.
- However, if you're just looking for an **enjoyable** movie and a **good** time, this is one to see.

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## Hunston and Sinclair – Local Grammar Patterns

Thing evaluated <b>noun group</b>	Hinge <b>link verb</b>	Evaluative Category <b>evaluative group with 'too' or 'enough'</b>	Restriction on Evaluation <b>to-infinitive or prepositional phrase with 'for'</b>
He Their relationship	looks was	too young strong enough	to be a grandfather for anything

Hinge <b>what + link verb</b>	Evaluative Category <b>adjective group</b>	Evaluating Context <b>prepositional phrase</b>	Hinge <b>link verb</b>	Thing evaluated <b>clause or noun group</b>
What's	very good	about this play	is	that it broaden's people's view.
What's	interesting		is	the tone of the statement.

# Hunston and Sinclair – Parsing Steps

1. Detecting regions to be parsed
2. Determining which pattern to use
3. Parsing that pattern

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# Overview of Appraisal Extraction

Bloom, Garg, and Argamon (2007)

- Identify attitude groups using lexicon and shallow parsing.
- Identify a subset of common targets using lexicon.
- Hook them together using a grammatical parse. (And find more targets too!)
- Select the best appraisal expression for each attitude group.

# Overview of Appraisal Extraction

Bloom, Garg, and Argamon (2007)

- Identify attitude groups using lexicon and shallow parsing.
  - > *Detecting regions to be parsed*
- Identify a subset of common targets using lexicon.
- Hook them together using a grammatical parse. (And find more targets too!)
  - > *Parsing each pattern*
- Select the best appraisal expression for each attitude group.
  - > *Determining which pattern to use.*

## Identify Attitude Groups

- Lexicon of 3814 appraisal head words, with Systemic-Functional attributes.
- 207 modifiers, applied to the head words, updating the attributes.

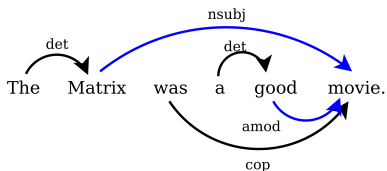
## Identify a Subset of Common Targets

- Domain specific target lexicon contains common nouns used as targets in a given domain.
- For movies, contains a per-movie list of actors, characters, writers, directors.
- Not included: generic professions of characters, generic ways to refer to people, specific plot specific elements.

## Hook them together using a grammatical parse.

Rule target  $\xrightarrow{nsbj}$  noun  $\xleftarrow{amod}$  attitude

Example



More rules attitude  $\xrightarrow{amod}$  target (matches this sentence)

target  $\xrightarrow{nsbj}$  attitude (doesn't match)

attitude  $\xrightarrow{iobj}$  verb  $\xleftarrow{nsbj}$  target (doesn't match)  
(38 more)

## Select the best appraisal expression

1. Find all linkages in the parse where:
  - Linkage is in the list of linkage specifications
  - Linkage connects to a chunked attitude
  - Linkage need not connect to chunked target
2. For each attitude group, if any linkage connects to chunked target, remove linkages that don't.
3. Pick the linkage that was first on the list of linkage specifications.

**Result** One linkage per attitude group.

**Future work** Select best linkage using machine learning.

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# Learning Linkage Specifications

Find all attitude groups in corpus

Find subset of candidate targets

**for** each attitude group **do**

**for** each candidate target in the same sentence **do**

        find specification of shortest path through

        dependency parse with less than 5 links that connects  
        attitude and target

**end for**

**end for**

## Gathering Statistics

Statistics computed on all linkage specifications as they are discovered.

**Both** number of times specification appears with both attitude and candidate target.

Statistics computed on top  $n$  specifications, ranked by *Both*.

**NoTarget** number of times specification appears with attitude but no target

**NoAttitude** number of times specification appears with target but no attitude

**Neither** numbers of times specification appears connected to neither

$$RuleScore = Both \cdot \frac{Both}{Both + NoTarget}$$

## Accuracy of Learned Linkage Specifications

- Computed full statistics for top 100 linkage specifications by *Both*.
- Retained top 50 best scoring rules.
- Evaluated on 150 appraisal expressions from movie reviews, and 150 from product reviews.  
(data from Bloom, Garg, and Argamon, 2007)

Corpus	Experiment	Appraisal	HumTgt	Correct	Percent
Products	manual	117	105	73	69%
	learned	116	105	68	64%
Movies	manual	128	101	63	62%
	learned	116	89	50	56%

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# Conclusions

- Appraisal as a structure overlaid on a general grammar.
- Unified method for extracting appraisal in many different grammatical structures.
- Automatic learning of patterns performs as well as hand-constructed lists of patterns.
- Automatically learned patterns can give insight about grammatical patterns.