

GWC 2008: Panel on WordNet Relations

# Annotating WordNet Synsets by Sentiment-Related Information: Issues and Potential Solution

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# Sentiment Analysis (aka Opinion Mining)

- Analysis of documents, sentences, phrases, terms, term senses according to the opinion, sentiment, attitude, appraisal they express.
- Many applications, for example:
  - Product review analysis:
    - *Which features of X, customers like/dislike most?*
  - Opinion trend tracking:
    - *What presidential candidate is the most criticized?*
  - Comparative evaluation:
    - *Is X better than Y? Why?*

# Sentiment Analysis (aka Opinion Mining)

Document level:

"I met Joe at the last GWC. He is an estimable person, and a good researcher. Unfortunately we don't work on the same topics."

Sentence level:

"I met Joe at the last GWC. He is an estimable person, and a good researcher. Unfortunately we don't work on the same topics."

# Sentiment Analysis (aka Opinion Mining)

Term sense level:

"He is an **estimable** person."



"It is an *estimable* quantity."

Same POS, just different senses, captured by WordNet:

- estimable(1): deserving of respect or high regard
- computable(1) estimable(3): may be computed or estimated; "a calculable risk"; "computable odds"; "estimable assets"

# SentiWordNet

- All the 115,424 synsets of WordNet 2.0, have *automatically* assigned a **positivity** and a **negativity** score.
- Only orientation, with (few) errors.

 <p>A sentiment triangle with a grid. The top-left is green, top-right is red, and bottom is yellow. A blue ball is at the bottom vertex. The number '0' is in the center.</p> <p>P = 0, N = 0, O = 1</p>	<p><u>computable(1) estimable(3)</u> <i>may be computed or estimated; "a calculable risk"; "computable odds"; "estimable assets"</i></p>
 <p>A sentiment triangle with a grid. The top-left is green, top-right is red, and bottom is yellow. A blue ball is on the left edge. The number '0' is in the center.</p> <p>P = 0.75, N = 0, O = 0.25</p>	<p><u>estimable(1)</u> <i>deserving of respect or high regard</i></p>

# Dimensions of subjective language

- *Orientation* is the most actively investigated dimensions in literature.
- The *Force* of subjective expressions is another relevant dimension:

“He is a **nice/wonderful** person.”

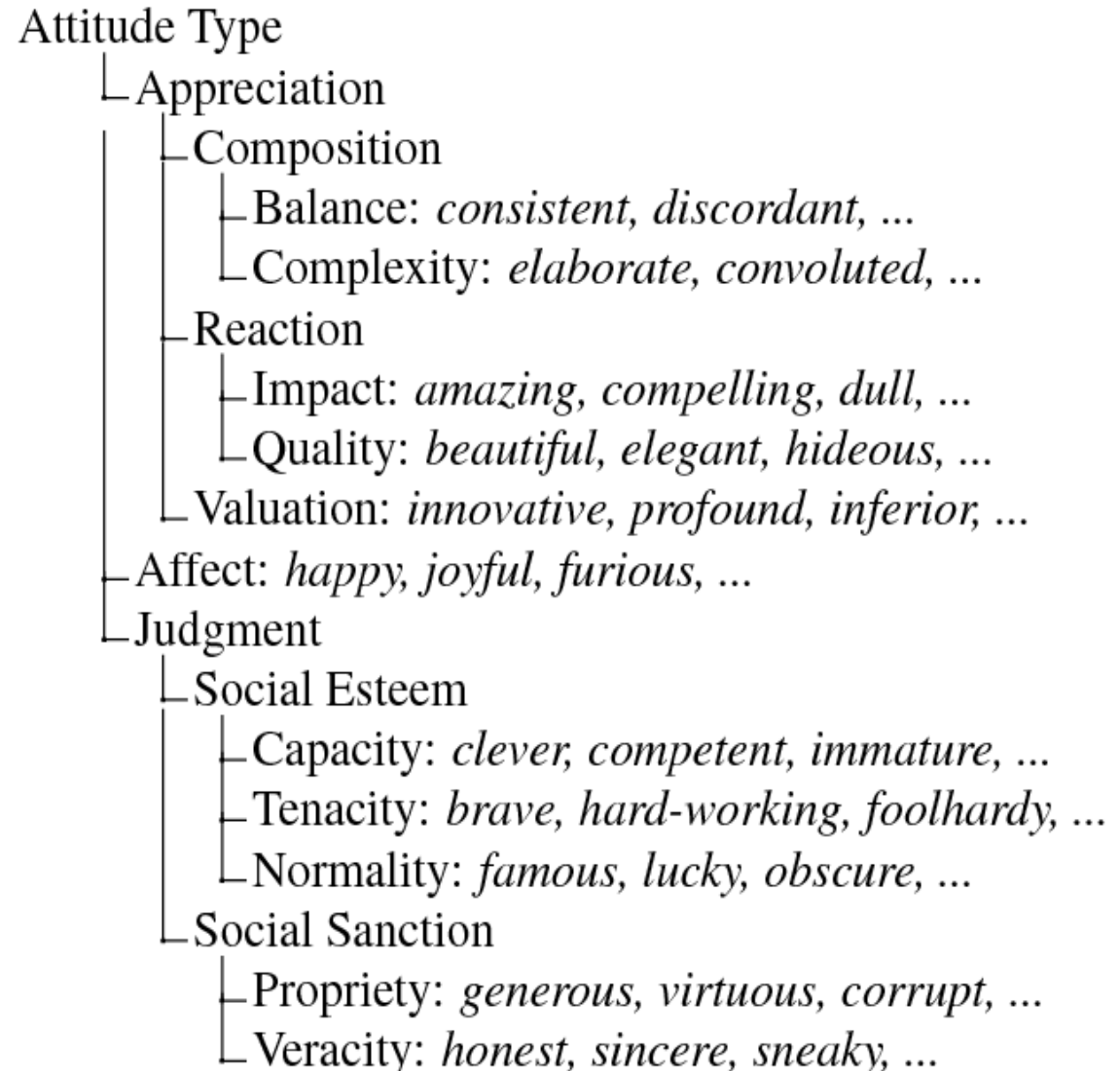
“He is a **bad/horrible** person.”

- The *Attitude* dimension of subjective language have been less investigated:

“He is a **beautiful/honest** person.”

# Attitude type in Appraisal Framework

- Martin's Appraisal Framework, developed within the tradition of Systemic Functional Linguistics.
- An approach to exploring the evaluative use of language.
- Proposes a taxonomy of attitude types.



# WordNet-Affect

- WordNet-Affect (Valitutti et al.) labels WordNet synsets which represent affective concepts

A-Labels	Examples
EMOTION	anger#n#1, fear#v#1
MOOD	animosity#n#1, amiable#j#1
TRAIT	aggressiveness#n#1, competitive#j#1
COGNITIVE STATE	confusion#n#2, dazed#j#2
PHYSICAL STATE	illness#n#1, all_in#j#1
EDONIC SIGNAL	hurt#n#3, suffering#n#4
EMOT.-ELICITING SIT.	awkwardness#n#3, endangered#j#1
EMOTIONAL RESPONSE	cold sweat#n#1, tremble#v#2
BEHAVIOUR	offense#n#1, inhibited#j#1
ATTITUDE	intolerance#n#1, defensive#n#1
SENSATION	coldness#n#1, feel#v#3



# Attitude types in SIMPLE-CLIPS

- PAROLE-SIMPLE-CLIPS is a four-level, general purpose computational lexicon that has been elaborated by ILC-CNR.
- In the *semantic level* a part of the *meaning components* is devoted to define attitude-related properties.

TEMPLATE TYPE	Meaning Component	Subtype	Example
PSYCHOLOGICAL PROPERTY	experience/feeling		<i>sad</i>
	psych. state		<i>crazy</i>
	cognition		<i>well-known</i>
	attitude_salience		<i>important</i>
	attitude_evaluation	moral	<i>righteous</i>
		esthetic	<i>beautiful</i>
		behaviour	<i>strict, friendly</i>
		adequacy	<i>sufficient</i>
		effort/feasability	<i>difficult</i>
		functionality	<i>efficient</i>

# Annotating sentiment-related properties in WordNet

- **Goal: annotate all the WordNet synsets on a set of sentiment-related properties.**
- Which sentiment-related properties?

It's hard to cover all the sentiment-related aspects of language, the choice may be driven by applications.

Orientation

+ Force

+ Attitude/Affect types (a “best-of” selection)

\* Subjectivity is implicitly denoted by the presence of any of these properties.

# Annotating sentiment-related properties in WordNet

- **Sentiment related properties are not always just label assigned to synset.**
- In some cases more information is desirable:
  - Distinction could be made as to which semantic role of the verb the polarity is projected:

“Joe **tortured** him.”

“Joe **discarded** the broken iPod.”

# Doing the job

- **WordNet is a large resource.**
- 117,659 synsets in WN 3.0.
- More than one human evaluation per synset is necessary to guarantee data quality.
- Many properties to be evaluated.
- A LOT of work!

# Doing the job

- **WordNet is a large resource.**
- Approach 1 (WordNet Evocation-like):
  - 1) Manual annotation of a *core* subset of the resource.
  - 2) Automatic annotation of the remaining part.
- Approach 2:
  - 1) (Automatic) annotation from already available resources (SentiWordNet, WordNet-Affect).
  - 2) Manual annotation starting from relevant items spotted in Step 1.

# Conclusion

- Annotating sentiment-related properties in WordNet is not an painless task:
  - Needs a careful definition of relevant properties.
  - Requires a lot of work.
- But...
  - ...could be done incrementally (by relation or by synset relevance)
  - ...once done would make WordNet even more invaluable resource for Sentiment Analysis.
- Any suggestion is welcome!