Learning Subjectivity Phrases through a Large Set of Semantic Tests

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Outline

- **Task**: Building Lexical and Semantical resource for opinion mining

- **Current resource**: French Evaluation Lexicon (*core lexicon*)

- **Method**
  - New candidates extraction
  - Semantic Tests (*is a candidate subjective or objective?*)
  - Decision: SVM algorithm

- **Results** (*enhanced lexicon*)
  - Evaluation without context
  - Evaluation in context
Building Lexical and Semantical resource for opinion mining (1)

- Opinion mining tends to **fine-grained evaluation detection** (Wilson, 2008)

- More features at **evaluation grain** (not only +/-):
  - **Semantic fields** *(moral/ethic, intellect, pragmatic, aesthetic, emotion, etc.)*, **attitudes** (also called **modalities**) (Charaudeau, 1992) (Galatanu, 2000) (Martin & White, 2002)
    - **judgement**: to condemn, to lie, lie, to cheat, cheater, etc.
    - **appreciation**: to love, ugly, useless, clever, etc.
    - **emotion**: anger, pain, pleasure, etc.
  
- **Belief degree**
  - **opinion**: to doubt, to think, to be convinced, etc.
  - **agreement/disagreement**: to agree, Yes, Ok, etc.

- **Enunciative strategy** *(presence of personal pronoun or not)*

  *I'm sure that he's lying* VS. *This is obvious that he's lying*
Building Lexical and Semantical resource for opinion mining (2)

- Several lexicons in the area (mostly simple words):
  - **SentiWordNet** (Esuli & Sebastiani, 2006): 115,000 synsets/words from WordNet
  - **Subjectivity Lexicon** (Wilson and al., 2005): 5,569 words (lemmas + inflected forms)
  - **WordNet-Affect** (Strapparava & Valitutti, 2004): 4,787 words
  - **(french) Sentiment Lexicon** (Mathieu, 2005) : ≈ 1,000 words

- Weak points:
  - Other languages (Banea and al., 2008)
  - Lexicons coverage (*phrases, idiomatic expressions, cultural stereotypes*)
    - **Coup de foudre** "lightning strike" = love at first sight
    - Politique de l'autruche "ostrich policy" = to bury one's head in the sand
    - **Bol d'oxygène** "oxygen bowl" = a breath of fresh air
  - Features: Positive, Negative, Subjective (Strong, Weak, Neutral)
Phrase/Word subjectivity is context dependent

"An objective word (semantical level) can become subjective (pragmatic or discursive level)" - (Kerbrat-Orrechioni, 1997)

*He is terribly **english** (that's why i like him so much)*

Some words are subjectives (semantical level) or so much used in a subjective way (pragmatic level)

*Donner de la confiture aux cochons*

"To give marmalade to pigs" = To cast pearls before swine

Core French Evaluation Lexicon (Vernier et al., 2009): 982 words extracted manually from a blog corpus
French Evaluation Lexicon (2)

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- Features: polarity, modality, context, ambiguity type
- Example: sérieux serious

Lemma: sérieux
POS: adjective

Evaluation: judgement polarity: negative context: raise serious problem
Evaluation: judgement polarity: positive context: he is very serious when he is working

- Number of hits on Yahoo!Search for sérieux: 46,901,002
- Average number of hits of core lexicon entries: >40,000,000 (frequent words)
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Semantic Tests of Subjectivity

- How to decide when a phrase/word require to be added to the lexicon?

**Assumption:** A neutral term (*adjective*, *noun*, *verb*) is rarely intensified by an intensity marker.

**Examples:**
- It's a **true** heresy.
- He **truly** fall under the spell.
- He is **very** dynamic
- A **true** banana republic
- He **literally** stole the show
- It's **really** a dog's life

- It's **terribly** scalar
- It's **literally** a bird.
- He **truly** ate at restaurant
- It's **really** handknitted
Candidates Extraction (1)

- **8 Queries** on a search engine (Yahoo!Search)
  - 8 intensity markers = \{littéralement, vraiment, véritable, véritablement, particulièrement, parfaitement, réellement, terriblement\} \{literally, really, real, particularly, perfectly, terribly\}

- Collected corpus: **800,000** texts of abstracts given by Yahoo!Search

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**Le Figaro - Actualités** - Translate
Après avoir soulevé l’enthousiasme de l’assistance et littéralement mouillé sa chemise, le candidat va se changer dans la loge en compagnie de ...
lefigaro.fr/magazine/20070421.MAG000000034_les_coulisses.... - 96k

**Toddler Driving Me Crazy!!! HELP!! - Mamapedia™**
Literally work up a sweat trying to get him dressed. I change him on the couch so that he can continue to watch his cartoons so I know that it isn't because of that. ...
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**Candidates:**

Mouiller sa chemise

"To wet his shirt"= To work up a sweat

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Toddler Driving Me Crazy!!! HELP!! - Mamatopia™

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Candidates Extraction (2)

- **Chunking algorithm** (from Vergne et al., 1998) to extract noun phrases/nouns, verbal phrases/verbs, adjectives

- **24,500 distinct candidates**: 9,000 nouns or noun phrases
  - 9,000 adjectives
  - 6,500 verbs or verbal phrases

- **Examples**:
  - aborigène, république, prendre la grosse tête, république bananière, français, anglais, indien, arabe, échapper des griffes, glandouiller
  - aboriginal, republic, getting full of yourself, banana republic, French, English, Indian, Arabic, to run away from, to do useless things

- Most of them don't have to be added to a subjectivity lexicon
Training Data

- 5 human-judges: to determine if a candidate is subjective or not (*without context*)

- 1,500 candidates: 500 adjectives, 500 nouns/phrases, 500 verbs/phrases

- 3 categories: Subjective, Objective, Both or Impossible to answer without context

- Fleiss Kappa: 0.70 (Fleiss, 1971)
  - Quite good agreement
  - Most of disagreements include "Both or Impossible to answer without context"
Learning Procedure (1)

- **1,500 supervised examples**: Category + Features
- **8 features** for each candidates
- Pointwise mutual information: Intensity marker / candidate

\[
SI(X, Y) = \log \left( \frac{hit(X, Y)}{hit(X) \cdot hit(Y)} \right)
\]

- \( Y \): a candidate
- \( X \): an intensity marker
- \( hit(X) \): number of hits on Yahoo!Search for the querie ”X”
- \( hit(X, Y) \): number of hits on Yahoo!Search for the querie ”X Y”

**Examples**: english, descent into hell
- \( hit(\text{anglais}) \): >300,000,000
- \( hit(\text{anglais}) \): 500
- \( hit(\text{descente aux enfers}) \): 197,173
- \( hit(\text{descente aux enfers}) \): >5,000
Learning Procedure (2)

- **SVM Classification** (Joachims, 1997)
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Results

- from the list of candidates (24,500) : 2,474 ”subjective” terms extracted

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<thead>
<tr>
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<th>Adjective</th>
<th>Verb</th>
</tr>
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<tbody>
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<td>Fléau</td>
<td>Larmoyant</td>
<td>jouer un rôle décisif</td>
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<tr>
<td>Plague</td>
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<td>≈To play a decisive role</td>
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<tr>
<td></td>
<td></td>
<td>the game</td>
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### Results

- Extracted 2,474 “subjective” terms from the list of candidates (24,500) - Infrequent words/phrases

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Evaluation (1) : 1\textsuperscript{st} Evaluation without context

- **1,500 candidates** classified by human-judges
- Evaluation : *10 cross-validation* during the learning step

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"Ambiguous candidates" tend to be classified as "subjective"
Evaluation (2) : 2\textsuperscript{nd} Evaluation in context

- **Extraction**: 5,000 blog posts (+comments) from over-blog.com
- **Comparative evaluation**: *is an added term subjective or not in context?*
  - Detection of evaluative segments with lexical projection of **core** and **enhanced lexicons**
  - Evaluation of differences

- **Core lexicon**: 68,536 evaluative segments
- **Enhanced lexicon**: 17,669 evaluative segments (+25.78%)
- Enhanced lexicon precision in context: 13,450/17,669 (78.7%)
Discussion & Perspectives

- French Evaluation Lexicon:
  - From 982 entries to 3,456 entries (+252%) (size is comparable with existing resources for English)
  - Infrequent words (meaningful for fine-grained analysis) and idiomatic phrases learning

- Method:
  - Adapted to follow cultural stereotypes:
    - The most admitted: holocaust denier
    - The most recent: ecology, pollution tend to be very intensive/subjective words
  - Is it re-usable for other languages? Which intensity markers?
Two main perspectives:

- Learning features for each added terms:
  
  **Polarity**: pointwise mutual information (Turney, 2002)
  
  **Modality/Attitude**: automatically?

- Contextual desambiguisation for polysemic (objective/subjective) words/phrases

  **Example**: *farce* (French) has 2 meanings

  *Subjective (Joke)*: *Prank*
  
  *Objective (Cooking mixture)*: *Stuffing*
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