Learning Subjectivity Phrases through a Large Set of Semantic Tests

Matthieu Vernier, *Laura Monceaux*, *Béatrice Daille*
University of Nantes (France) – LINA

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 burry one's head in the sand
    - *Bol d'oxygène ”oxygen bowl”* = a breath of fresh air

  - Features: Positive, Negative, Subjective (Strong, Weak, Neutral)

French Evaluation Lexicon (1)

- 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)

- Core French Evaluation Lexicon (Vernier et al., 2009): 982 words

- 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)**

French Evaluation Lexicon (2)

- Core French Evaluation Lexicon (Vernier et al., 2009): 982 words

- Features: polarity, modality, context, ambiguity type

- Example: *sérieux* serious

  Low coverage
  Evaluation in context: 50%
  (Vernier et al., 2009)

  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)**

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 <u>true</u> **heresy**.

  - He <u>truly</u> **fall under the spell**.

  - He is <u>very</u> **dynamic**

  - A <u>true</u> **banana republic**

  - He <u>literally</u> **stole the show**

  - It's <u>really</u> **a dog's life**

  - It's <u>terribly</u> **scalar**

  - It's <u>literally</u> **a bird**.

  - He <u>truly</u> **ate at restaurant**

  - It's <u>really</u> **handknitted**

Candidates Extraction (1)

- **8 Queries** on a search engine (Yahoo!Search)

  - 8 intensity markers = {*littéralement, vraiment, véritable, véritablement, particulièrement, parfaitement, réellement, terriblement*} *{literraly, really, real, particularly, perfectly, terribly}*

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

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™
I **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. ...
www.**mamapedia**.com/article/toddler-driving-me-crazy-help - 79k

Candidates Extraction (1)

- **8 Queries** on a search engine (Yahoo!Search)

  - 8 intensity markers = {*littéralement, vraiment, véritable, véritablement, particulièrement, parfaitement, réellement, terriblement*} *{litteraly, really, real, particularly, perfectly, terribly}*

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

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

Candidates:

Mouiller sa chemise

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

Toddler Driving Me Crazy!!! HELP!! - Mamapedia™
I **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. ...
www.mamapedia.com/article/toddler-driving-me-crazy-help - 79k

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 (<u>without context</u>)

- 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

$$SI(X,Y) = \log\left(\frac{hit(X,Y)}{hit(X)\,hit(Y)}\right)$$

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(*anglais*): >300,000,000   hit(*descente aux enfers*): 197,173
   hit(X, *anglais*): 500   hit(X, *descente aux enfers*): >5,000

Learning Procedure (2)
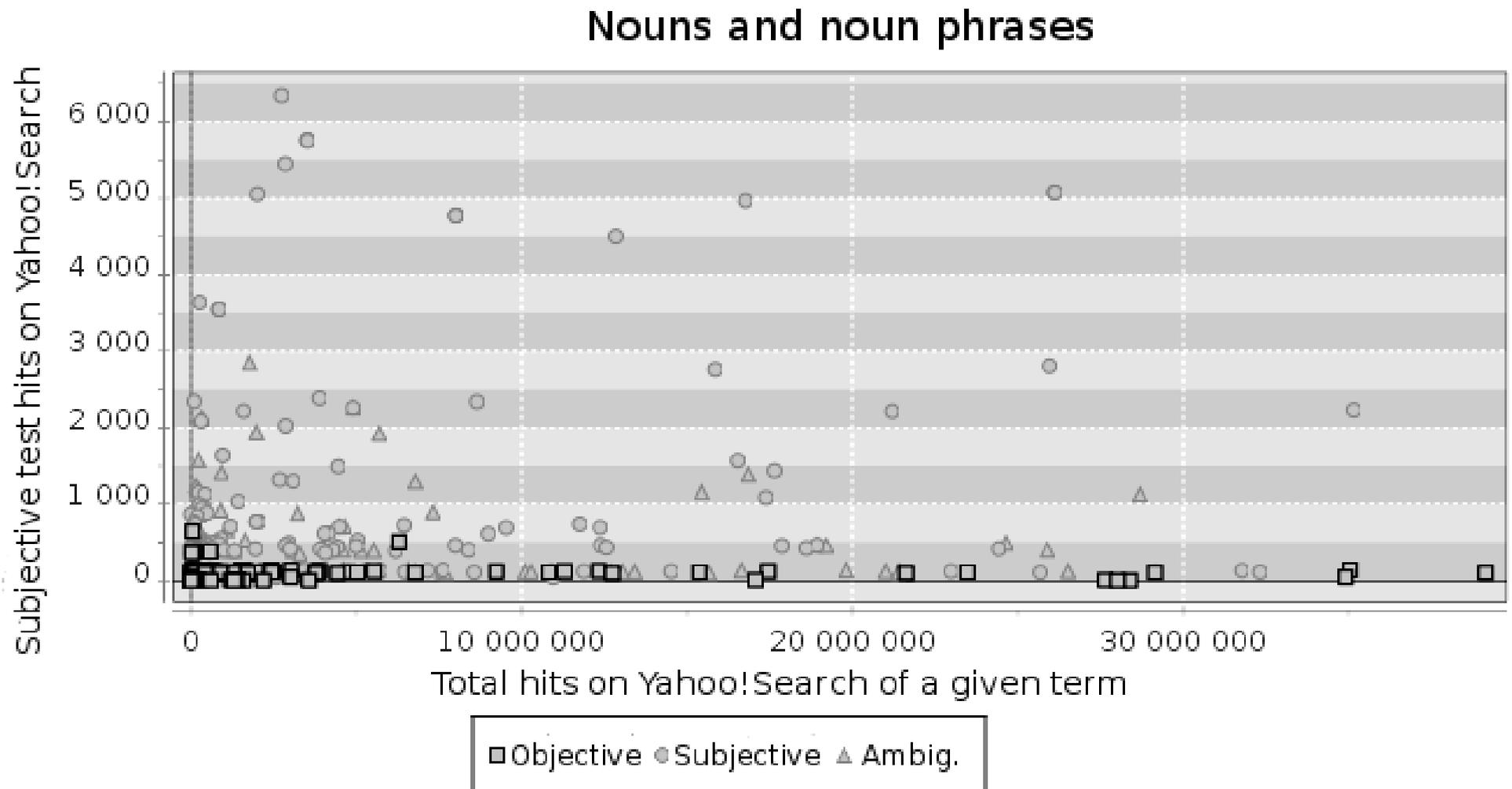
- **SVM Classification** (Joachims, 1997)

Nouns and noun phrases

X-axis: Total hits on Yahoo!Search of a given term

Y-axis: Subjective test hits on Yahoo!Search

Legend: □ Objective ● Subjective ▲ Ambig.

Learning Procedure (2)

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

Nouns and noun phrases

Objective ● Subjective ▲ Ambig.

Learning Procedure (2)

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

Nouns and noun phrases

Subjective test hits on Yahoo!Search vs. Total hits on Yahoo!Search of a given term

Legend: □ Objective ● Subjective △ Ambig.

OBJECTIVE

Learning Procedure (2)

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

Nouns and noun phrases

Subjective test hits on Yahoo!Search vs. Total hits on Yahoo!Search of a given term

SUBJECTIVE

OBJECTIVE

Legend: □ Objective ● Subjective △ Ambig.
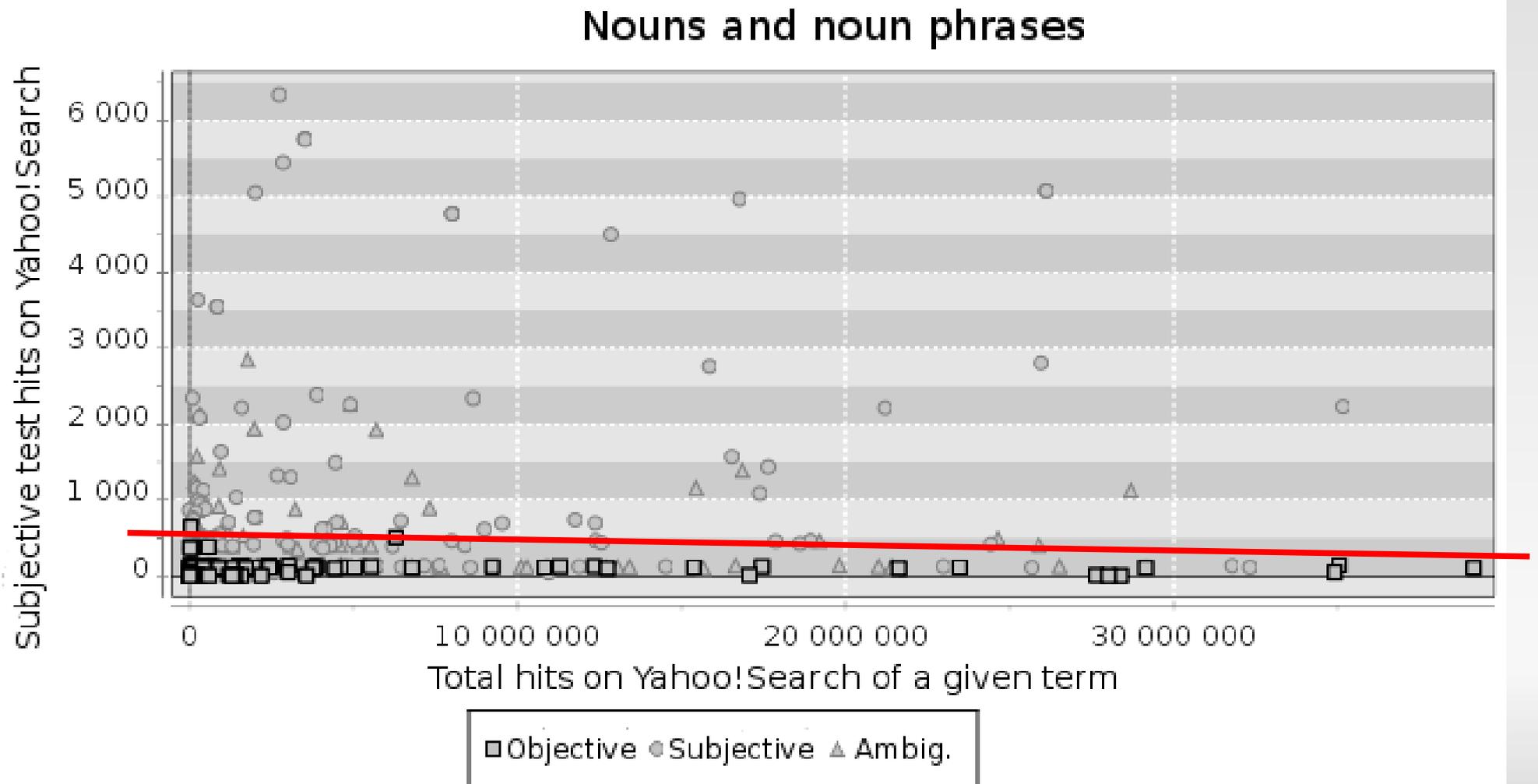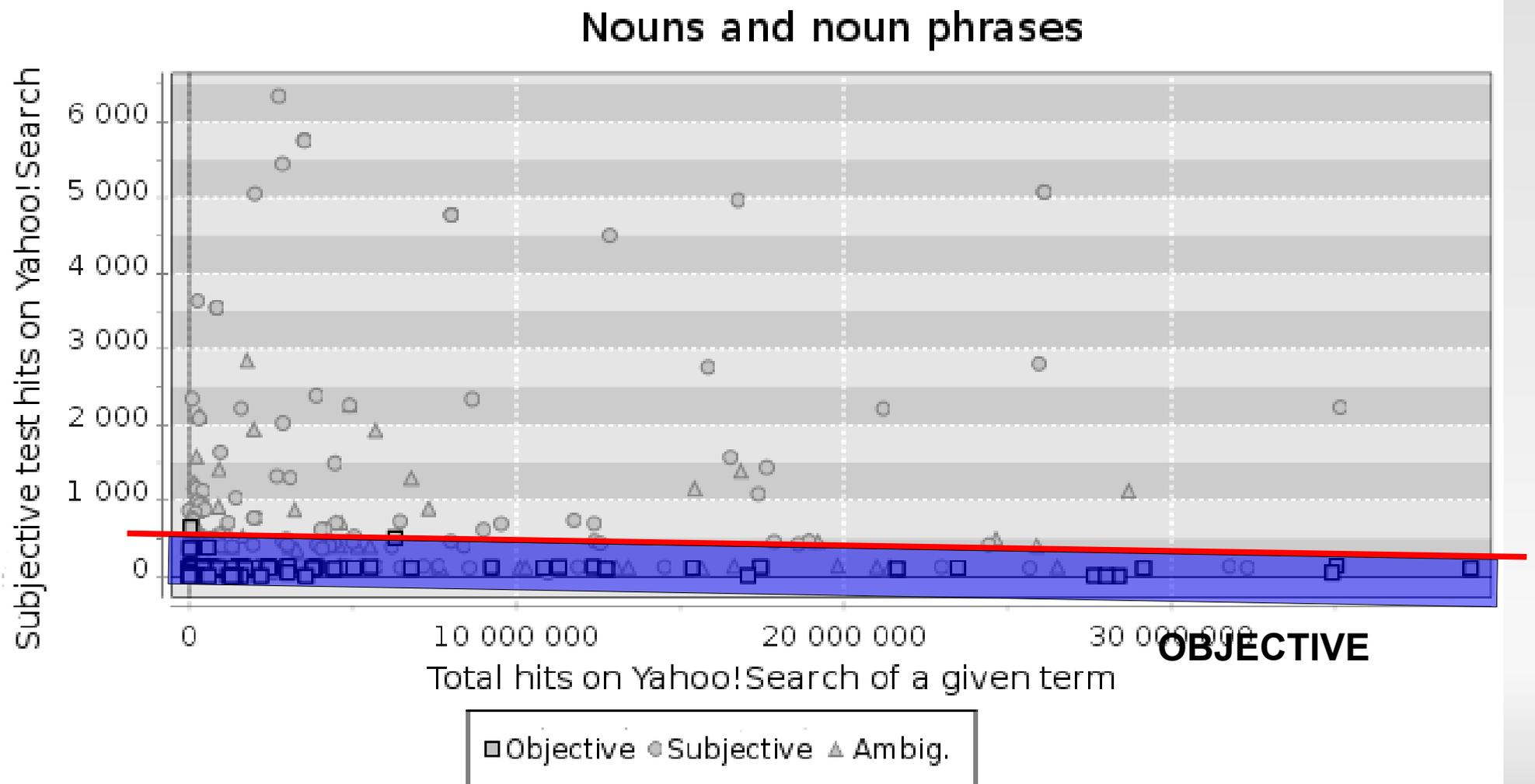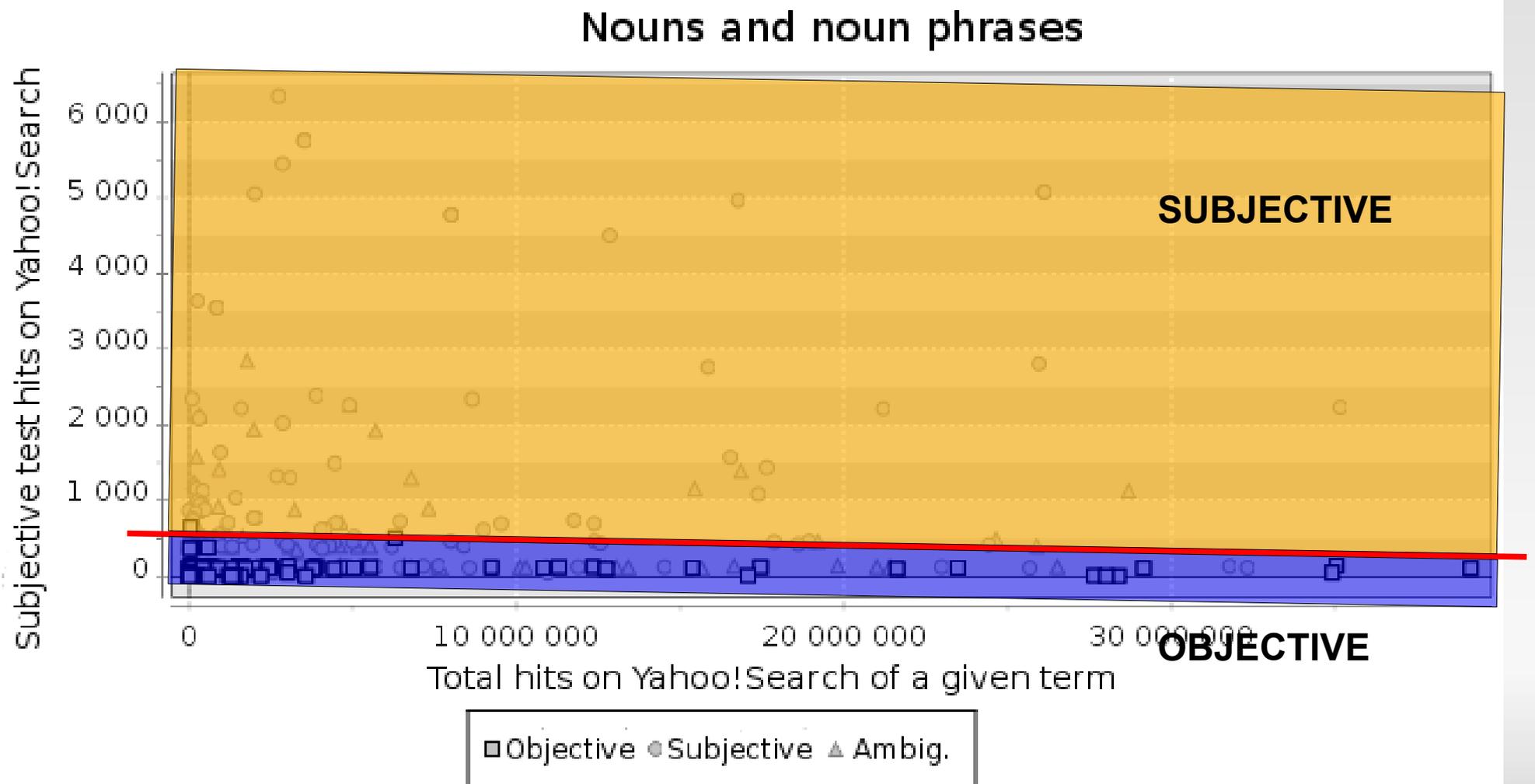
Results

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

Noun	Adjective	Verb
Fléau Plague	Larmoyant Whining	jouer un rôle décisif *≈To play a decisive role*
Plébiscite Plebiscite	Exhorbitant Exhorbitant	faire basculer le match *≈To change the momentum of the game*
Camouflet Poking	Opiniâtre *≈Opstinate*	Subjuguer To subjugate
Gain de temps Time-savings	Lunatique Moody person	Voler la vedette To steal the show
Bouffée d'air frais Breath of fresh air	Subversif Subversive	Toucher le fond To plomb the depths

Results

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

———► Infrequent words/phrases

Noun	Adjective	Verb
Fléau 6,190,063 Plague	Larmoyant 326,007 Whining	jouer un rôle décisif 29,390 *≈To play a decisive role*
Plébiscite 1,030,036 Plebiscite	Exhorbitant 880,013 Exhorbitant	faire basculer le match 5,130 *≈To change the momentum of the game*
Camouflet 1,150,023 Poking	Opiniâtre 495,011 *≈Opstinate*	Subjuguer 776,000 To subjugate
Gain de temps 2,340,008 Time-savings	Lunatique 1,510,008 Moody person	Voler la vedette 310,014 To steal the show
Bouffée d'air frais 43,101 Breath of fresh air	Subversif 1,190,045 Subversive	Toucher le fond 668,000 To plomb the depths

Evaluation (1) : 1st Evaluation without context

- **1,500 candidates** classified by human-judges

- Evaluation : *10 cross-validation* during the learning step

Category	Precision	Recall
Objective	75,49% (687/910)	94,62% (687/726)
Subjective	77,28% (456/590)	61,81% (356/576)
Ambiguous	-% (0/0)	0% (0/198)

Evaluation (1) : 1st Evaluation without context

- **1,500 candidates** classified by human-judges

- Evaluation : *10 cross-validation* during the learning step

Category	Precision	Recall
Objective	75,49% (687/910)	94,62% (687/726)
Subjective	77,28% (456/590)	61,81% (356/576)
Ambiguous	-% (0/0)	0% (0/198)

⇒ *"Ambiguous candidates" tend to be classified as "subjective"*

Evaluation (2) : 2nd 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 recents: *ecology, pollution* tend to be very intensive/subjective words

    - Is it re-usable for other languages ? Which intensity markers ?

Discussion & Perspectives

- 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*

Learning Subjectivity Phrases
through a Large Set of Semantic Tests

Matthieu Vernier, *Laura Monceaux*, *Béatrice Daille*
University of Nantes (France) – LINA