Personal Semantic Indexation of Images using Textual Annotations

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Summary

1. Motivation of this work
   - On-line services for personal photos management
   - Semi automated image annotation
2. Semantic interpretation of personal annotations
   - Geographical Places and Person names ambiguities management
   - Paraphrases management
   - Paraphrases personal resolution
3. Personalization of proposed descriptors
4. Evaluation
5. Conclusion

Motivations

- The digital revolution of personal pictures
  - **Digital cams, mobile telephones web cams …**

- **Image is a new way of communication and a subject of communications**
  - **MMS, Blogs, On-line albums …**

- **A need to share**

  "The average inflow of pictures is: **38.400 photos/hour**. That is around 10 photos/second, 920.000 photos/day. "

  source : http://blog.forret.com/2006/10/a-picture-a-day-flickrs-storage-growth/

Album photo de voyage

Argentine
Buenos Aires
Iguazu
La Patagonie
Les Andes
Terre de Feu
Indonésie
Bali
Bornéo
Java
Ujong Kulon
Volcan Bromo
Volcan Kawa Ijen
Yogyakarta
Lombok
Volcan Rinjani
Sulawesi
Bunaken
Iles Togian
Macassar
Palu
Pays Toraja
Maroc
Singapour
Index des photos

Une mère et sa fille dans un village proche des grandes salines

my brother's girlfriend + blog - Google -- Recherche d'images - Wanadoo

Fichier Edition Affichage Favoris Outils ?

Précédente Rechercher Favoris

Adresse http://images.google.fr/images?svnum=10&hl=fr&lr=&q=my+brother%27s+girlfriend+%2B+blog OK Links

Coach On

Rocco, **my brother** Peter's **girlfriend** ...
600 x 493 pixels - 199 ko - jpg
blog.myspace.com

... **my brother** Peter's **girlfriend** ...
566 x 600 pixels - 239 ko - jpg
blog.myspace.com

... **my brother** Mike and his **girlfriend**,
189 x 170 pixels - 7 ko - jpg
brendoman.com

from **my brother** and his **girlfriend** ...
320 x 240 pixels - 60 ko - jpg
www.cs.northwestern.edu

... a lot like **my girlfriend's brother**-
201 x 265 pixels - 21 ko - jpeg
pclbaseball.com.ismmedia.com

My Way of Life
200 x 315 pixels - 66 ko - gif
www.georgeblowfish.com

... **My** boyfriend's lil **brother** and ...
448 x 336 pixels - 26 ko - jpg
suicidegirls.com

My brother and his **girlfriend** Donna
400 x 300 pixels - 42 ko - jpg
lefamily.joueb.com

My brother and his **girlfriend** Donna
2048 x 1536 pixels - 704 ko - jpg
iceman75.free.fr

... **my brother** and his adorable ...
704 x 528 pixels - 152 ko - jpg
blog.myspace.com

... **My brother** by default, Kevin ...
288 x 384 pixels - 29 ko - jpg
blog.myspace.com

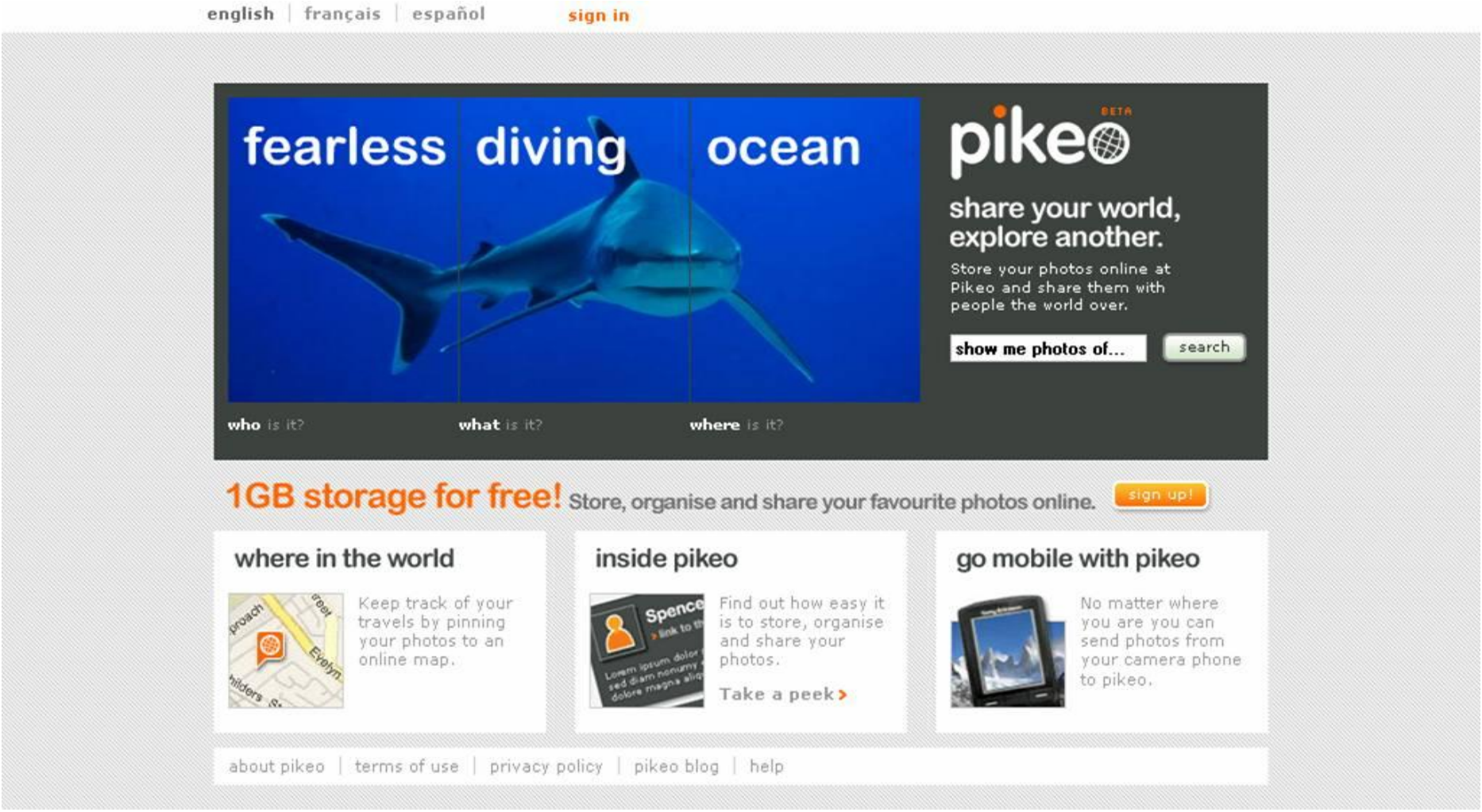
ME, **my girlfriend**, ...
73 x 73 pixels - 4 ko - jpg
www.bolt.com

Google ▶

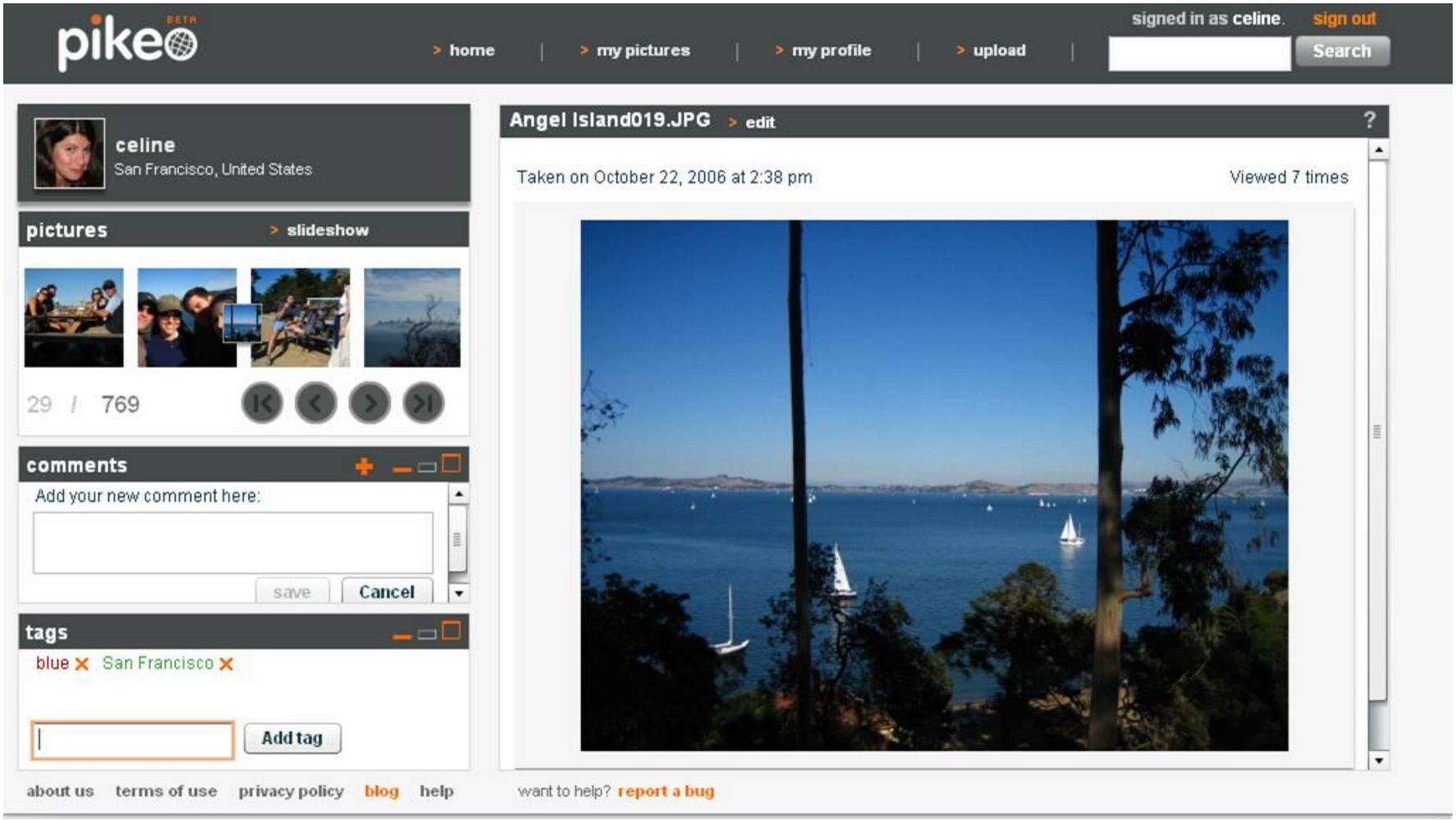
(1 élément restant(s)) Téléchargement de l'image http://images.google.fr/images?q=tbn:eo1VRwgS8k_W

Internet

Pikeo : On line service for pictures sharing



Pictures comments and tagging



pikeo BETA

> home | > my pictures | > my profile | > upload |

signed in as celine. sign out

Search

> link to this page

hugo

hugo's albums(1)

sort By Date (old to new)

view all

Vacances ...

hugo's tags

who / what / where

paysage sunset mobile sardaigne animal

sarah emilie Maroc corse

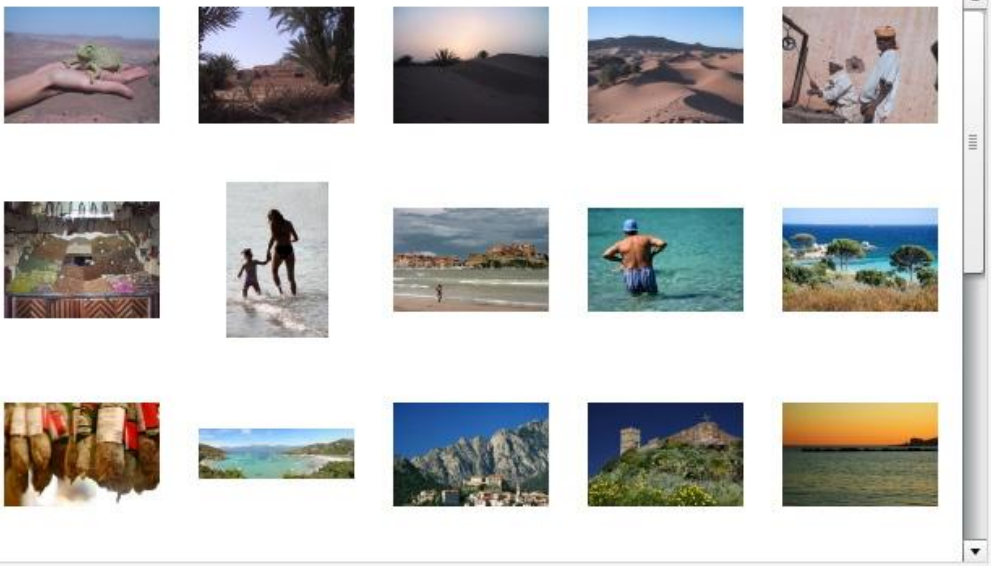
hugo's contacts (6)

celine luca lynx obelix155

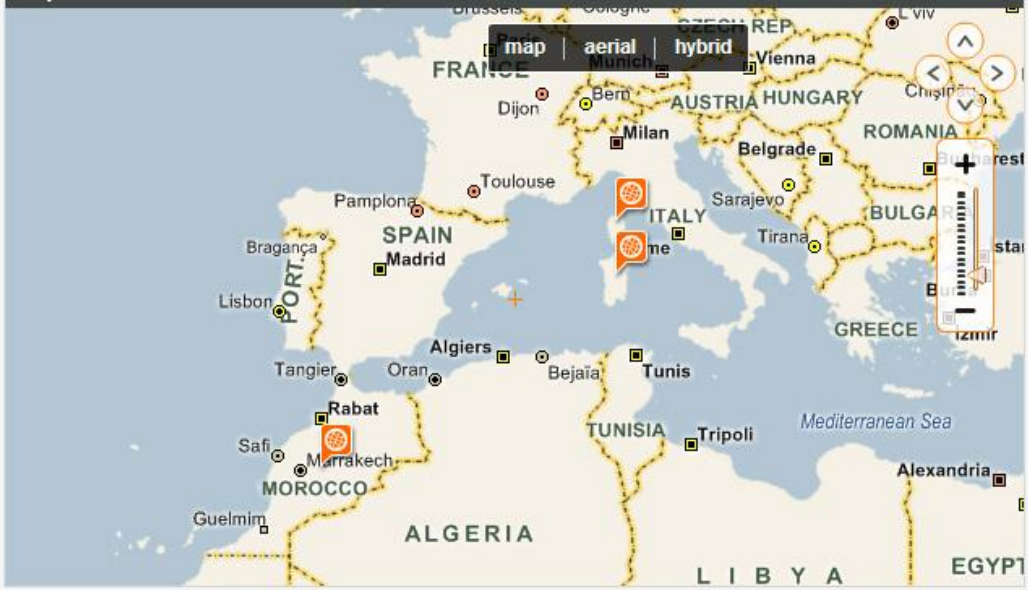
phil_w vince

hugo's pictures(18)

> view all > slideshow



map



Someone - PHOTO - - Microsoft Internet Explorer

Fichier Edition Affichage Favoris Outils ?

demo, Vous êtes dans : "Mes Photos"

Albums | Personnes | Lieux

- ma famille (11)
  - papa (3)
  - maman (5)
  - Sylvain (2)
  - Nicolas (0)
- mes amis (2)
  - Olivier (0)
  - Fabrice (0)
  - mon voisin (0)
  - Delphine (0)
  - Stéphane (2)
- mes collegues (6)
  - Olivier (2)
  - Saïd (4)
- moi (3)

Diffuser la personne sélectionnée

Pour créer un nouvelle personne, saisissez son nom (Vous pouvez sélectionner une personne

11 photos sur : Personnes > ma famille

Affiner votre requête :
par Albums : trié à trier
par Personnes : Sylvain maman papa

Arreter le diaporama

une photo récente de mon frère à Florence
May 4, 2005 5:01:21 PM
Albums : à trier Personnes : ma famille
Modifier / Supprimer

Propositions du moteur d'indexation : 2I
Lieux : ☐ ⇒ Florence Score=0.86 Personnes : ☐ ⇒ Sylvain Score=1
☐ ⇒ Nicolas Score=1

Local intranet

Corpus analysis

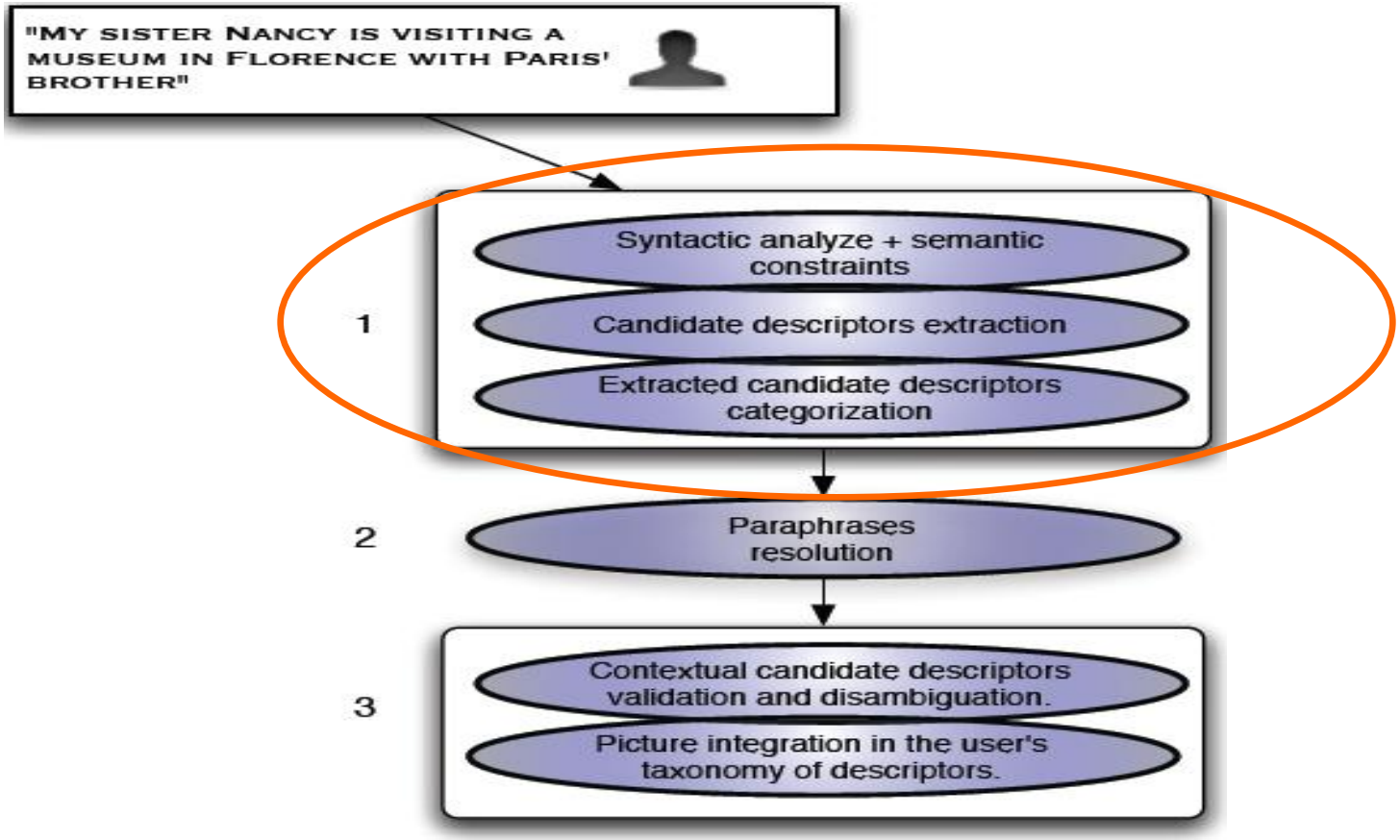
- 30 URLs of personal albums
- 637 pictures annotations

- Average 8 words
- 90% a single sentence
- 95% contain a proper name of a person or a place
  - "The italian capital by night"
  - "Sophia and Martina spleeping on the beach"
  - "My uncle Joe (1999)"
  - "Sam and me"

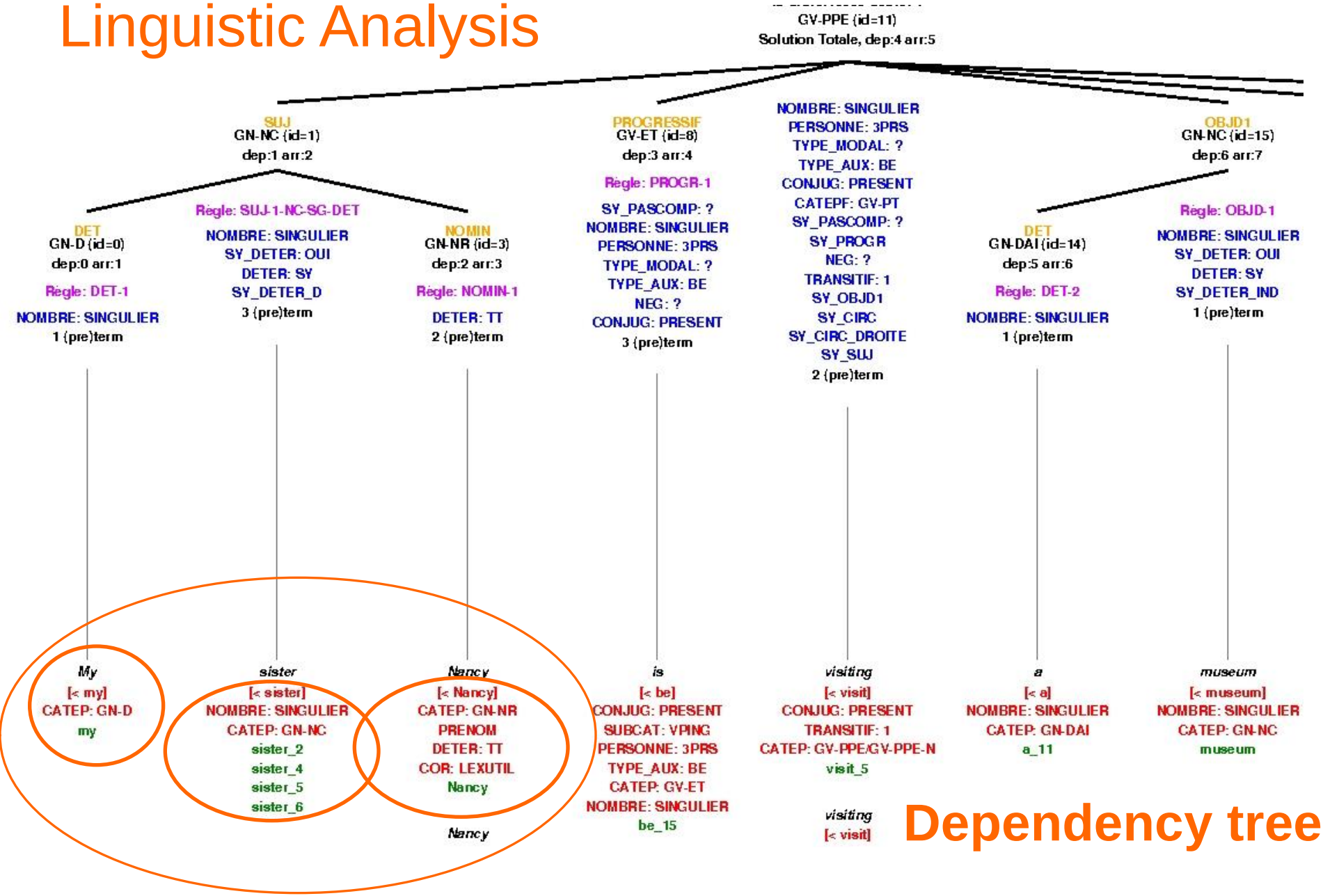
Some key issues

- Places and People
  - 1708 entries in our French lexicon can be categorized as a place or person
    - Paris , Florence , Nancy …
  - And more Places are composed of first names (St Michel)
- Use of paraphrases or references
  - My sister, a friend …
  - A museum in Paris , a beach in Rio
- Organizing new descriptors in the user's own taxonomy

Semantic interpretation of personal annotations



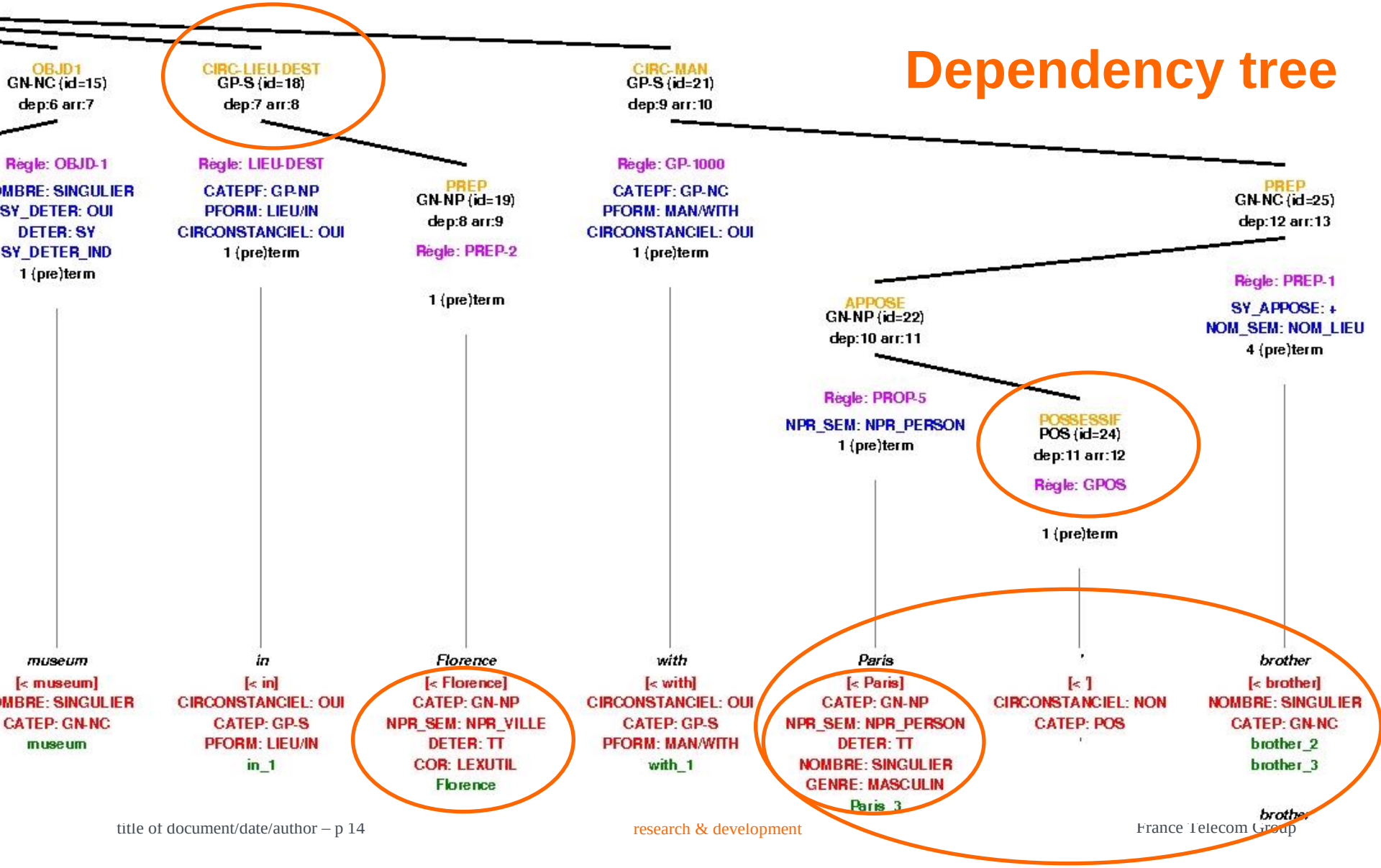
Linguistic Analysis



Dependency tree

Linguistic Analysis

Dependency tree

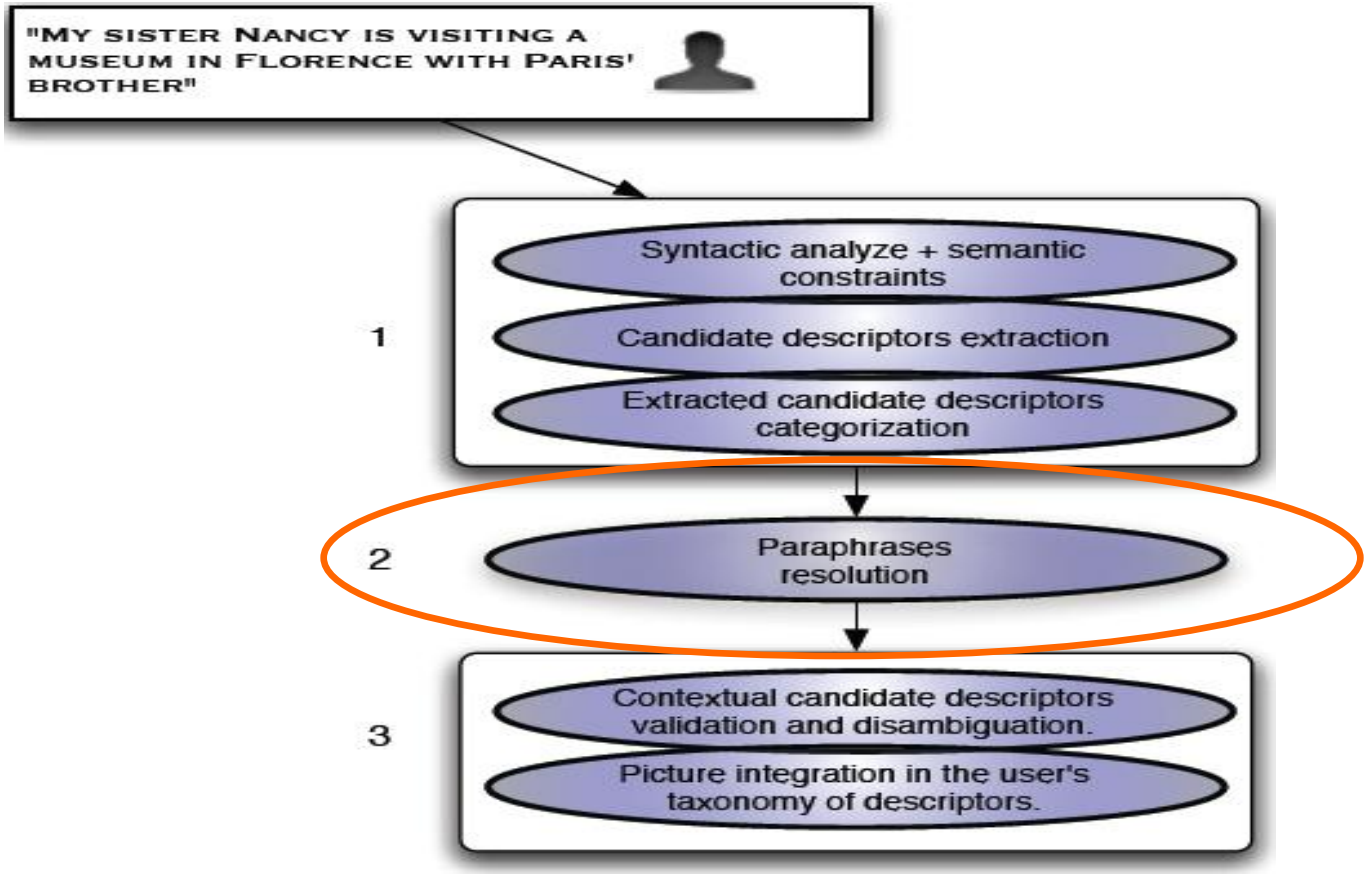


Candidate descriptors extraction and categorization

- Extraction
  - Chunks of words
    - "My sister Nancy"
    - A museum in Florence => in Florence
    - "Paris's Brother"
  - With proper nouns or relationships between people
- Classification: Use of lexical and syntactic features computed according to semantic constraints
  - *"Place"*
  - *"Place paraphrase"*
  - *"Person"*
  - *"Person paraphrase"*
  - *"Resolved person paraphrase"*

  Ambiguities lead to a list of classified candidate descriptors and are resolved during a next step

Semantic interpretation of personal annotations



Semantic management of paraphrases

- Acquisition of semantic relations between people
  - From candidate descriptors categorized as "*resolved person paraphrase*"

    "My sister Nancy"
  - Use of OWL ontology about relations betweens persons

    :User23456 :sister :x789

    :x789 :name :Nancy
  - Use of rules to deduce new relations
    - :x789 :brother :User23456

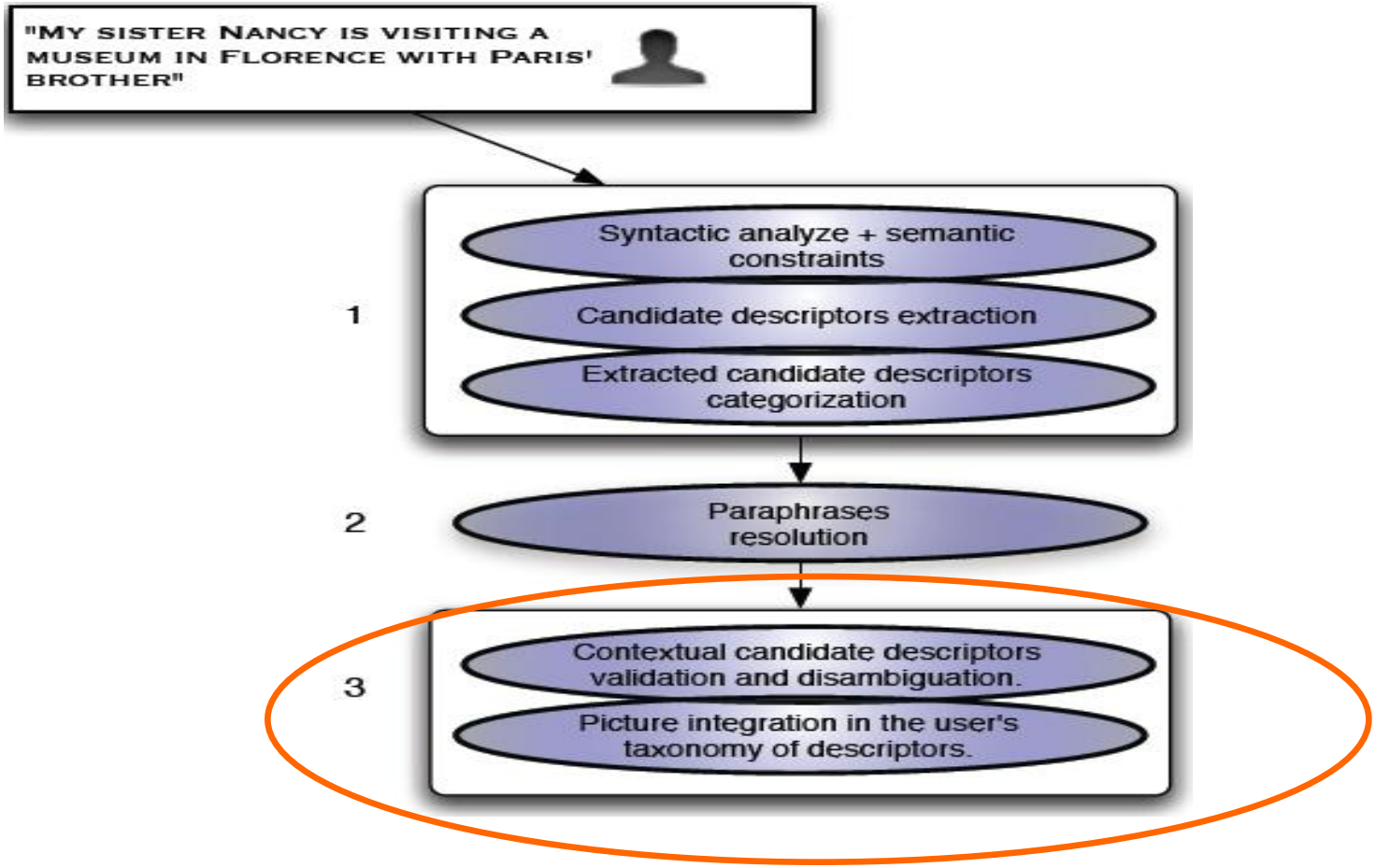
Semantic management of paraphrases

- Resolution of paraphrase
  - Persons : Use of persons ontology

    "My sister on the beach" => "Nancy"
  - Places : Use of the "Thesaurus of Geographical Names" (Getty Research Institute)

    "a Museum in Florence" => "a bounded list of museum names"
  - All possibilities lead to a list of candidate descriptors
  - Initial paraphrase is kept associated to candidate descriptors for indexing and retrieval purposes
  - All relations used are also associated to each resolved descriptor for later process

Semantic interpretation of personal annotations



Validation , ambiguity resolution using context

- Contextual information
  - Descriptors in the same category ascribed to pictures in the same album at the nearest date
  - Indexation of the same picture by other users
  - Already existing descriptors managed by the user
- When ambiguities, candidate descriptors with a relation with contextual information are kept
  - Ex: In "Picture of Florence" :
    - World/ Europe/Italy/Tuscany/Firenze province/Florence ?
    - Florence as a person ?
- Unambiguous candidate descriptors with a relation with contextual information are automatically validated

Integration of new descriptors in the user's taxonomy

- Manual validation of the user of ambiguous candidate descriptors

- Creation and integration of new descriptors in the user's taxonomy

  Use of semantic information associated to candidate descriptors

  - Family/sister/Nancy =>
    - Sister is created as sub descriptor of Family
    - Nancy created as a sub-descriptor of sister
  - World/ Europe/Italy/Tuscany/Firenze province/Florence
    - Europe , Italy, Tuscany, Firenze province Florence created , or linked to existing descriptors

First Evaluation

- Manual analysis of 269 annotations

- Proper names ambiguities cause many errors
- Robustness to incorrect sentences need to be improved

- Need to support more expressions patterns
  - Nancy, (my sister) , Nancy: my sister, my sister –Nancy - …

Conclusions

- Semantic indexation
  - not just a bag of words
  - But named entities with relations
- Need to
  - Classify named entities : Places or People
  - Solve paraphrases or references
- Personalized interpretation using context
  - Indexation of previous images, user's taxonomies, user's relationships ontology…
- But NLP is difficult due to ambiguities and multiple forms of expressions