An Approch for Identifying and Analysing Reference Features and Spatial Relations Used in Mountain Emergency Call

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Introduction

- ANR Choucas : *Heterogeneous data integration and spatial reasoning to locate lost people in a mountain context*
- Objectives
  - Construction and enrichment of geographic data
  - Development of geovisualisation interface
  - Development of reasoning models

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Objectives

- Construction of methodology to collect *spatial relations* and *reference features* from emergency calls
- Analyse the calls transcriptions
- Visualise the emergency calls

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How to formalise the extraction of spatial descriptions from an emergency call ?

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What are the most used spatial relations and reference features ?

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How to represent the set of spatial descriptions extracted from an emergency call ?

Research issues

- Language approximations and imprecisions
- Description mistakes
- Variability of vocabulary
- More than one description for the same situation

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Taking into account the natural language imprecision, and the caller approximation *e.g.* "I'm near" *vs* "I'm at 50 meters"

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- Variability of vocabulary
- More than one description for the same situation

Confusion between two reference features or in the name of a reference feature

Research issues

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Polysemous words, near-synonyms *e.g.* “below” and “under”, different acceptances for a same world *e.g.* “on”

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Emergency calls

- The caller (victim or witness) contacts the rescuers by phone
- The caller gives elements on his situation
- He describe her position

For this research work :

- Call records are used
- No natural language processing

Summary

1. Building a call transcription template
2. Emergency calls transcription analysis
3. Sketch maps of emergency calls

Template objectives

« We are below the plateau and above the Oursière chalet and Ourisère waterfall »

- Calls segmentation
- Identify reference features and spatial relations

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1. We are below the plateau
2. We are above the Oursière chalet
3. We are above Oursière waterfall

Template objectives

« We are below the plateau and above the Oursière chalet and Ourisère waterfall »

- Calls segmentation
- Identify reference features and spatial relations

1. (We, below, the Plateau)
2. (We, above, the Oursière Chalet)
3. (We, above, Oursière waterfall)

Template objectives

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This is the first step to extract the semantic of descriptions and, by extention, to interpret the spatial descriptions made in natural language

Template description (1)

ext. id	exp. id	extract	timestamp
1	1	*« We started from the Plateau of Pra mountain hut »*	00:02:10
2	1	*«* **We are below the Plateau** *and above the Oursière Chalet and Ourisère waterfall »*	00:20:20
2	2	*«* **We are** *below the Plateau and* **above the Oursière Chalet** *and Ourisère waterfall »*	00:20:20
2	3	*«* **We are** *below the Plateau and* **above** *the Oursière Chalet and* **Ourisère waterfall** *»*	00:20:20
3	1	*« We are on the Oursière waterfall trak »*	00:30:08

Template extract 1, metadata

Template description (2)

Verb	Verb modifier	Spatial relation	Spatial relation modifier	Reference feature	Reference feature modifier
start		from		Mountain Hut	
be		below		Plateau of Pra	
be		above		Oursière Chalet	
have		above		Oursière Waterfall	
be		on		Waterfall track	

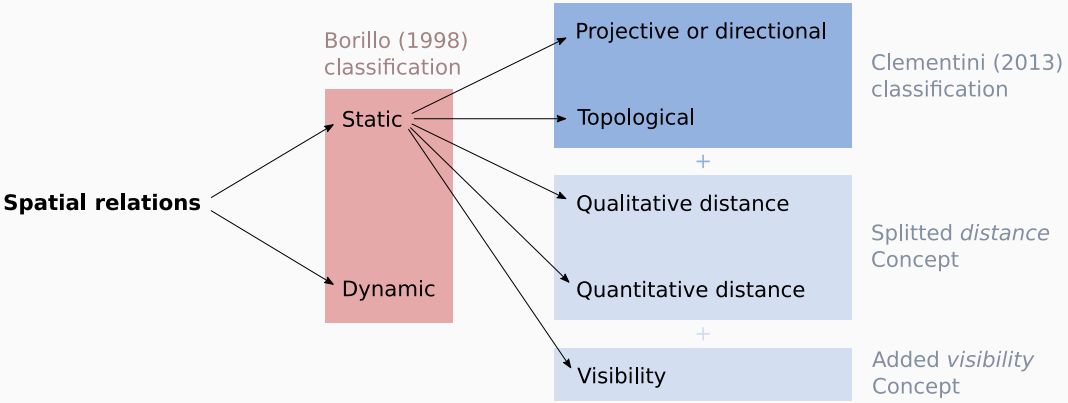
Template extract 2, expression interpretation

Emergency calls analysis: Dataset construction

45 emergency calls:

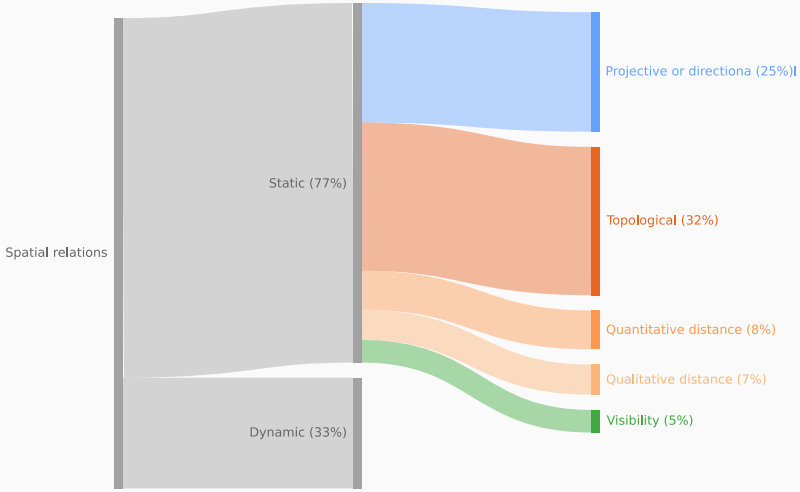
- Transcribed by authors and rescuers
- Partially verified
- 374 spatial descriptions identified

Emergency calls analysis: Semantic classification



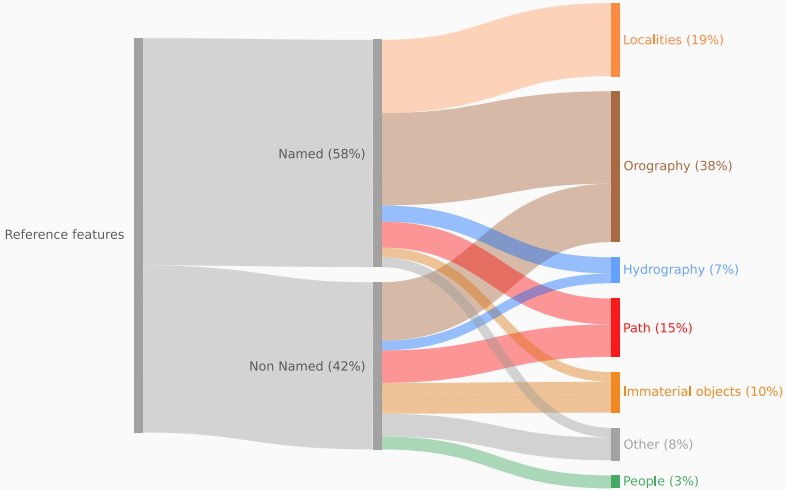
Spatial relation classification

Emergency calls analysis: A quantitative analysis



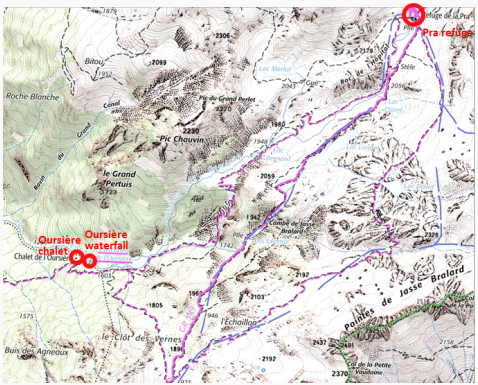
Occurences of spatial relations for our corpus

Emergency calls analysis: A quantitative analysis



Occurences of references features for our corpus

Utility of a synthetic visualisation



Example of reference features used in a call

"We started from the plateau of Pra mountain hut. We are below the plateau and above the Oursière chalet and Ourisère waterfall. We are on the Oursière waterfall track. We are in a forest at an altitude of 1500 meters"

- Difficulty for understanding the situation
- Reference feature $\neq$ subject position
- How to represent the spatial descriptions ?

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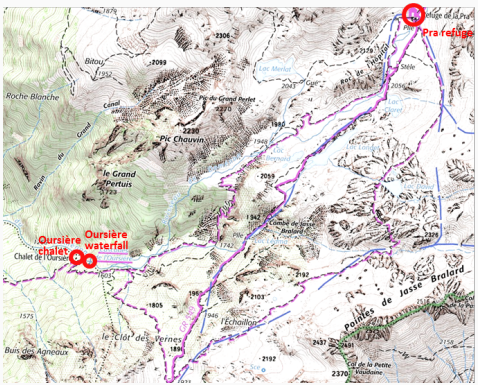

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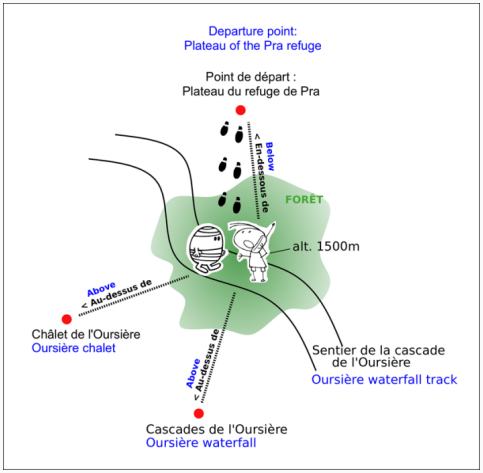
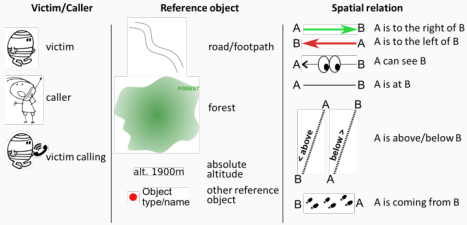
Designing the sketch maps



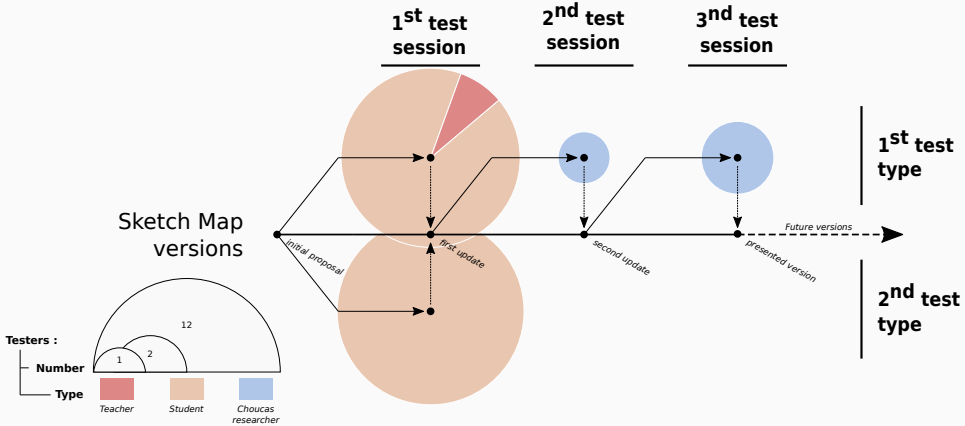
Sketch map example



Sketch map legend

- Reference features represented by nodes or surfaces
- Spatial relations represented by named edges or topologic relations

Evaluation process



Sketch maps evaluation process

Discussion and conclusion

Conclusion:

- Construction of a template
- Analysis of 45 calls
- Proposition of sketch map

Issues:

- Heterogeneity of transcriptions
- Template complexity
- Multiplicity of interpretations

Future works:

- Definition of a spatial relation ontology based on call transcriptions
- New analysis based on ontology concepts
- Build a geometry for each spatial description

Thanks for your attention

References

- Borillo, A. (1998): L'espace et son expression en français, Orphus, Paris.
- Clementini, E. (2013): Directional relations and frames of reference, GeoInformatica, 17(2)