Distant supervised learning for the TAC-KBP Slot Filling and Temporal Slot Filling Tasks

Guillermo Garrido, Bernardo Cabaleiro, Anselmo Peñas, Álvaro Rodrigo, Damiano Spina

NLP & IR Group at UNED

{ggarrido, bcabaleiro, anselmo, alvarory, damiano}@lsi.uned.es

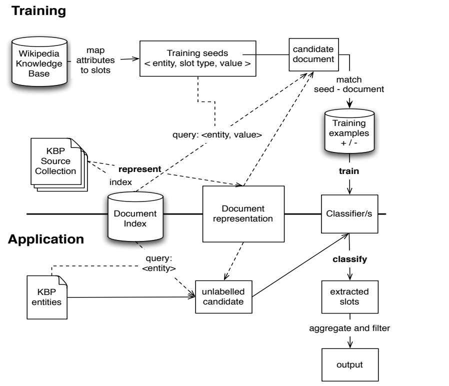
NLP & IR Group

nlp.uned.es

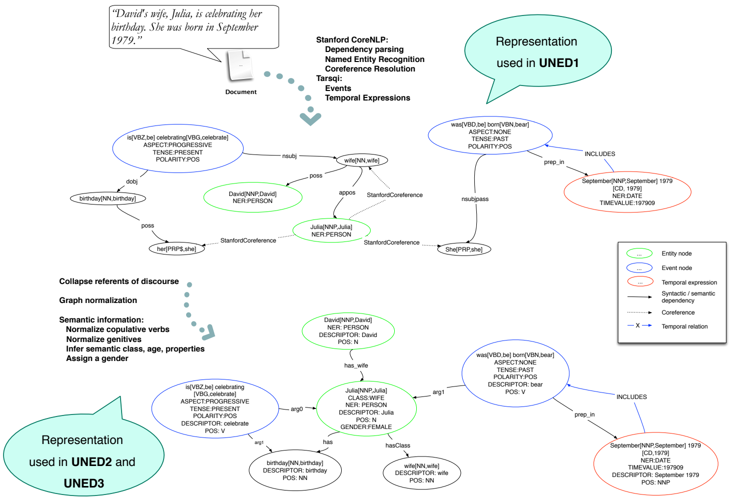
1. A distant supervised system, specialized for the Regular Slot Filling and Full Temporal Slot Filling subtasks

- Automatically gather *training data* for supervised *slot classifiers* from the initial Knowledge Base and source document collection.
- Use a *rich document representation*, augmenting syntactic dependency trees.
- Find and aggregate *time constraints* for the same slot value across different documents.

2. System Description: distant supervised learning.



3. Document Representation: augmented dependency graphs.



4. Slot temporal restrictions.

Temporal processing used in **UNED3**

- Use **Tarsqi** to get temporal relations: *included, simultaneous, after, before, begun_by, ended.*
- Temporal relations acquisition: identify a syntactic pattern:

  <EVENT> - <PREPOSITION> - <TIME EXPRESSION>

  within the lexical context of the extracted entity and value.
- Transform into one of: *within, throughout, beginning, ending, after, before.*
- Semantic considerations: classify time constraints: start – finish – period.

5. Learning extractors.

- Gathering of distant training examples: from a seed triple

  < entity, slot type, value >

  we retrieve candidate documents that contain both entity and value.
- Named Entity type matching.
- Each example was represented by binary features.
- Classification process: supervised classification (linear SVM).
- Answer aggregation

6. Regular Slot Filling Subtask (SF).

- By the time of submission, the system was **not fully developed** (we do not report results in this poster).
- Our training did not cover all seeds: use of supervised seeds.
- SVM multi-class classifier with the positive and negative examples.
- Results below average of the systems.

7. Temporal Slot Filling Subtask (TSF).

- We used a battery of binary classifiers: SVMLight.
- Once extracted the <entity, slot type, value >, temporal constraints are generated depending of semantics of the event, slot type and the temporal restriction found.
- Generated temporal constraints are aggregated.
- Results ***slightly above the median and mean of the systems***.

8. *Preliminary* Results: 2011 Temporal SF full task scores

System	# filled responses	Precision	Recall	F1
BLENDER2	1206	0.1789	0.3030	0.2250
BLENDER1	1116	0.1796	0.2942	0.2231
BLENDER3	1215	0.1744	0.2976	0.2199
IIRG1	346	0.2457	0.1194	0.1607
UNED2	**167**	**0.2996**	**0.0703**	**0.1139**
UNED1	**177**	**0.2711**	**0.0674**	**0.1079**
UNED3	**167**	**0.2596**	**0.0609**	**0.0986**
Stanford 12	5140	0.0233	0.1680	0.0409
Stanford 11	4353	0.0238	0.1453	0.0408
USFD20112	328	0.0152	0.0070	0.0096
USFD20113	127	0.0079	0.0014	0.0024

Slot	# filled in key	# filled responses	Precision	Recall	F1
per:stateorprovinces_of _residence	20	1	0	0	-
per:employee_of	86	1	0	0	-
per:countries_of _residence	44	3	0	0	-
per:member_of	109	59	0.1967	0.1065	0.1382
per:title	287	68	0.3528	0.0836	0.1352
org:top_members/ employees	89	20	**0.6034**	**0.1356**	**0.2214**
per:spouse	53	10	0.2377	0.0449	0.0755
per:cities_of_residence	24	5	0	0	-
TOTAL	712	167	0.2996	0.0703	0.1139

- We had **0** correct results for the **residence** slots! Why?
  - The assumption that for *< entity, slot type, value >*, a text that contains *entity* and *value* is a positive example is wrong.
  - <entity, value> might *express many relations.* This effect is stronger for some types (e.g. locations).

(see S. Riedel, L. Yao, and A. McCallum. 2010. Modeling relations and their mentions without labeled text. ECML/PKDD 2010)

9. Conclusions.

- The ***performance*** of our simple distant learning system ***varies by slot type***.
- Our systems (***TSF***) have the ***highest precision among participants, but low recall***.
- ***Graph representation*** has helped: we expect a performance improvement from a better document representation.
- ***Simple aggregation of dates*** found in documents was a strong baseline we could not beat.

Acknowledgements. Spanish Ministry of Science and Innovation, Holopedia project (TIN2010-21128-C02) and the Regional Government of Madrid, MA2VICMR (S2009/TIC1542).