Lessons learned (and questions raised) from an interdisciplinary Machine Translation approach

Lightening talk at the W3C Workshop on the Open Data on the Web, 23 - 24 April 2013, Google Campus, Shoreditch, London

Timm Heuss
University of Plymouth, Plymouth, United Kingdom

Motivation

Usual problems in NLP: Ambiguitities

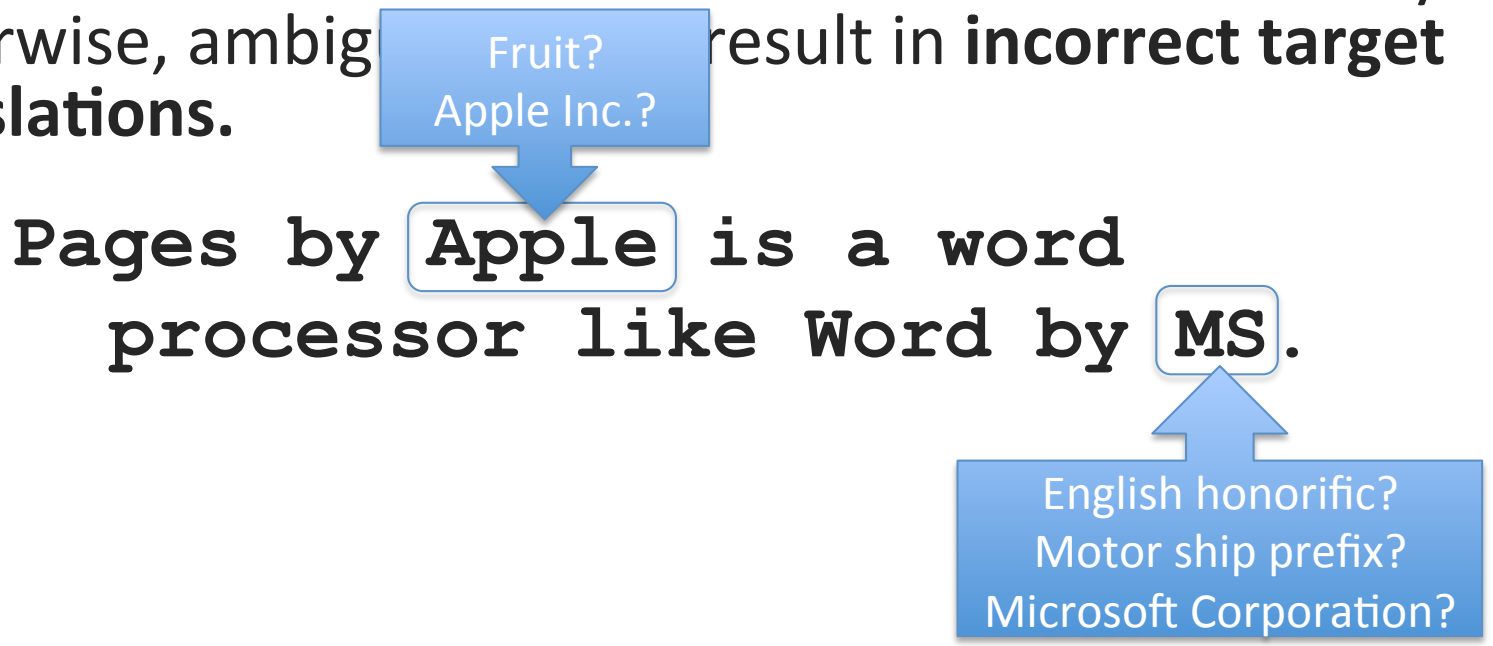
- The problem in many areas of Natural Language Processing (NLP) is the **ambiguity** of natural language on various levels, from word level to sentence level
- In the NLP-subfield of Machine Translation (MT), it is often **crucial to understand** the source text correctly – otherwise, ambiguities may result in **incorrect target translations.**

Pages by Apple is a word processor like Word by MS.

Motivation

Usual problems in NLP: Ambiguitities

- The problem in many areas of Natural Language Processing (NLP) is the **ambiguity** of natural language on various levels, from word level to sentence level
- In the NLP-subfield of Machine Translation (MT), it is often **crucial to understand** the source text correctly – otherwise, ambig result in **incorrect target translations.**



Motivation

Usual problems in NLP: Ambiguitities

- The problem in many areas of Natural Language Processing (NLP) is the **ambiguity** of natural language on various levels, from word level to sentence level
- In the NLP-subfield of Machine Translation (MT), it is often **crucial to understand** the source text correctly – otherwise, ambiguities may result in **incorrect target translations.**

Pages by Apple is a word processor like Word by MS.

- In this cases, strings can be only disambiguated on the basis of **world or expert knowledge**
- A typical solution: creation of **dedicated dictionaries**

A new Machine Translation approach

Semantic Web based Machine Translation (SWMT)

- Idea: use knowledge that already exists in form of LOD to enhance a Machine Translation task
  - Evaluate multi-language labels of RDF triples:

```
dbpedia:Microsoft_Word dbp:developer
      dbpedia:Microsoft .
dbp:developer rdfs:label "by"@en,
                    "von"@de, "entwickelt von"@de .
```

A new Machine Translation approach

Semantic Web based Machine Translation (SWMT)

- Idea: use knowledge that already exists in form of LOD to enhance a Machine Translation task
  - Evaluate multi-language labels of RDF triples:

```
dbpedia:Microsoft_Word                    er
        dbpedia:Microsoft .
dbp:developer rdfs:label "by"@en,
                  "von"@de, "entwickelt von"@de .
```

English:
Word by MS

German:
Word von Microsoft
Word entiwckelt von Microsoft

A new Machine Translation approach

Semantic Web based Machine Translation (SWMT)

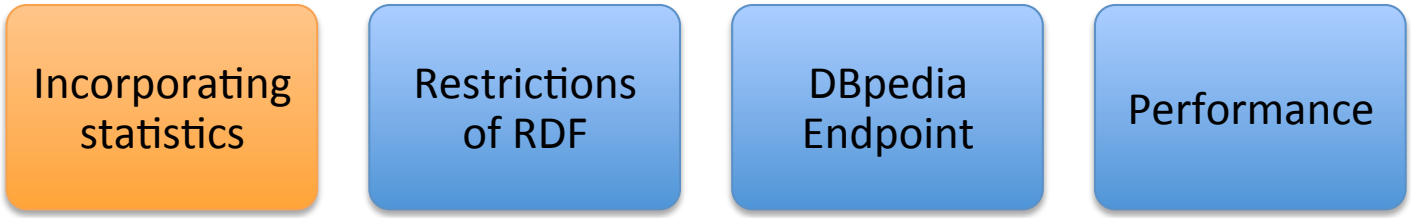
- Idea: use knowledge that already exists in form of LOD to enhance a Machine Translation task
  - Evaluate multi-language labels of RDF triples:

```
dbpedia:Microsoft_Word dbp:developer
      dbpedia:Microsoft .
dbp:developer rdfs:label "by"@en,
                    "von"@de, "entwickelt von"@de .
```

  - Integrate retrieved phrases into a MT process
- Good news: it works ☺ (see github.com/heussd)
- Not-so-good news: Some issues and conceptual mismatches emerged during development

Lessons learned and questions raised

Statistics



- In NLP, applications usually utilize various **statistics.**
- In the Web of Data, the **Open World Assumption** does not allow us the creation of statistics – it even „make[s] counting difficult“

  Dean Allemang and James A. Hendler,
  Semantic Web for the Working Ontologist

- **Is there a chance for statistics in LOD?**

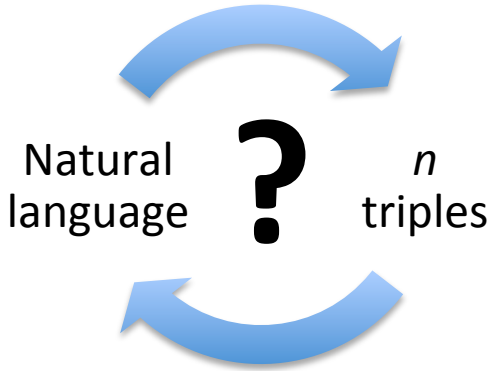
Lessons learned and questions raised

Restriction of RDF

Incorporating statistics | Restrictions of RDF | DBpedia Endpoint | Performance

- RDF triples are the backbone of the approach, which might resolve to small phrases of three or four words
- Real-world natural language sentences are more complex

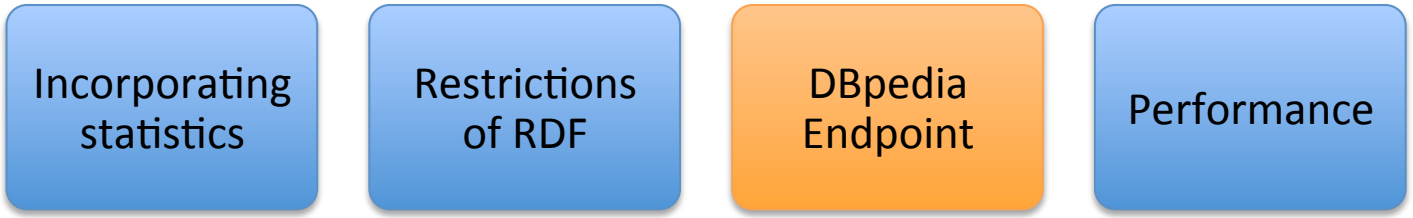
- **Does LOD claim to carry the complete sense of the human language?**
- **Is a seamless conversion possible?**



→ follow-up lightening talk: David Lewis
Interoperability Challenges for Linguistic Linked Data

Lessons learned and questions raised

DBpedia Endpoint



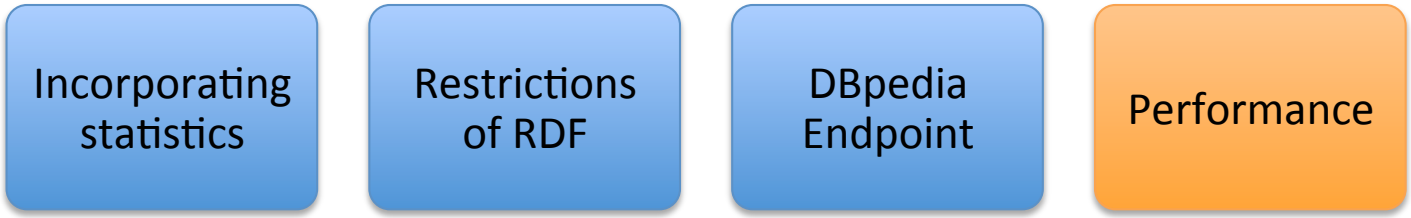
- The prototype cannot work live with DBpedia data (iSPARQL), because the query is too complex for the endpoint policies:

  "The estimated execution time 7219 (sec) exceeds the limit of 3000 (sec)"

- **Can the world's largest pooled collection of LOD only be queried with simple queries?**
- **What is the best practice in this case?**
  Obviously, additional program logic is required to create a application-specific cache for LOD

Lessons learned and questions raised

Performance



- Production of the translation phrases takes considerable time (about 1 second) – this might be to long for real-time NLP
- A triple store could speed this up
- A more specialized storage form could be even faster

- **If LOD would just be the input for an Extraction, Transfer and Load (ETL) process – wouldn't that be against the LOD vision?**
- **What is the most suitable storage form for RDF?**

Thanks for your attention!

Do you have any questions?

What do you think?

Contact me:

http://heussd.github.io