Adding Polarity Information to Entries of the Database of Bavarian Dialects in Austria

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Abstract

We describe in this short paper on-going work consisting in adding polarity information to entries that are included in the Database of Bavarian Dialects in Austria (DBÖ). With "polarity information" we refer to the positive or negative interpretation a word can carry. The starting point of our study is given by SentiMerge, a lexical resource that encodes polarity information for standard German words on the basis of integration processes performed on four pre-existing polarity lexicons. The lexical information of the entries of SentiMerge are encoded using the Ontolex model, which has been developed in the context of the W3C Ontology-Lexica Community Group, while the polarity information is encoded using the MARL ontological model, which has been developed at the Universidad Politécnica de Madrid. In the first phase of our work consisting in adding polarity information to entries of DBÖ, we focus on headwords describing color terms, taking also into consideration compound words.

Keywords: Polarity; DBÖ; Ontolex; MARL

1 Introduction

We investigate the possibility of adding polarity information to entries of the Database of Bavarian Dialects in Austria (DBÖ). With "polarity information" we refer to the positive or negative interpretation a word can carry. While this work can be partly achieved in analysing the textual content of examples or definitions associated to the headwords in DBÖ, it can be also achieved by establishing correspondences to existing polarity lexicons for standard German. One such lexicon is SentiMerge, described in (Emerson & Declerck 2014).[1] SentiMerge is a lexical resource that encodes polarity information for German words on the basis of integration processes performed on four pre-existing polarity lexicons (Clematide & Klenner 2010; Remus et al. 2010; Waltinger 2010 and Klenner et al. 2012). The resulting merged and cleaned lexicon consists of 15.287 lemmas marked with either positive or negative polarity, indicated by real numbers (from -1.0 to 1.0, neutral polarity being marked by the value "0.0"), to which also a confidence measure is associated. There are 5 levels of confidence, from low (3.536) to high (14.527), with the intermediate levels (5.823, 7.966 and 12.389). The four examples displayed in Table 1 (*jobless, to keep free, golden wedding anniversary, red card suspension*) show a negative polarity adjective and a negative polarity noun (both marked by the minus sign), a positive polarity verb and a positive polarity noun. In the last column of Table 1, the reader can see the confidence measure computed by the algorithms described in (Emerson & Declerck 2014).

[1] SentiMerge is available at https://github.com/guyemerson/SentiMerge

Entry	POS	Polarity Value	Confidence
arbeitslos	AJ	-0.968	14.527
freihalten	V	0.777	7.966
goldhochzeit	N	0.628	5.823
Rotsperre	N	-0.628	5.823

Table 1: Examples from SentiMerge

The examples in Table 1 are compound words and our interest lies in the possibility of marking elements of such compound words with polarity information and, in the longer term, to be able to propose an algorithm for computing the polarity of unknown compound words (i.e. words not listed in the SentiMerge lexicon) on the basis of the polarity of their elements, if those are included in the lexicon. For this study, there is thus the need to be able to encode elements of compound words, including their position in different compound words. Our choice here is the Ontolex model, which has been developed in the context of the W3C Ontology-Lexica Community Group.[2] For the representation of polarity information we opted for the MARL model[3], which has already been adopted for use in the context of sentiment lexicons published in the Linguistic Linked Open Data framework, as this has been described in details in (Buitelaar et al. 2013).[4]

2 Context of our Study: The exploreAT! Project

The study we present in this paper is embedded in the larger Digital Humanities project "*exploreAT!* - exploring Austria's culture through the language glass"[5] carried out at ÖAW-ACDH[6]. It is based on the *Database of Bavarian dialects in Austria (DBÖ)* and the *Dictionary of Bavarian Dialects in Austria* (WBÖ). This extensive collection of heterogeneous 20th century dialect data for dictionaries contains a wealth of information not only on dialectal word formations, but also on valuable cultural information relevant to the Austrian cultural heritage.

The corpus, originally collected by means of questionnaires each with around 20,000 questions, is estimated to contain 200,000 headwords in a set of about 4 Million records. In this context, colour terminology in particular has received much attention as they are an essential component of the vocabulary of almost all languages in the world (Berlin & Kay 1969). We are focusing thus on the extended semantic field of colour terms in Bavarian dialects, dealing also with various stages of the complex digital composition of non-standard linguistic data. At the same time, this rather local exploration of non-standard language material, combined with novel encoding methods in the field of (Linguistic) Linked Open Data enables the investigation and sustainability of lexicographic and digital humanities resources, supporting their linking to dictionary external data sets.

3 Encoding of Polarity Lexicon in Ontolex and MARL

We present first the encoding of the SentiMerge entry "Rotsperre" (*red card suspension*, see Table 1) in Ontolex and MARL and show how this can be easily ported to the lexical data contained in DBÖ.

[2] Examples of encoding of german compound words in Ontolex are give in (Declerck 2016), See also http://www.w3.org/community/ontolex/wiki/Final_Model_Specification for the Ontolex model.

[3] See http://www.gsi.dit.upm.es/ontologies/marl

[4] In the Appendix to this paper we display graphical views of the two models, Ontolex and MARL.

[5] See (Wandl-Vogt et al. 2015),

[6] http://www.oeaw.ac.at/acdh/en/node/187

```
(1) :Rotsperre_lex
      rdf:type ontolex:LexicalEntry ;
      lexinfo:partOfSpeech lexinfo:noun ;
      rdf:_1 :Rot_comp ;
      rdf:_2 :sperre_comp ;
      decomp:constituent :Rot_comp ;
      decomp:constituent :sperre_comp ;
      decomp:subterm :Sperre_lex ;
      decomp:subterm :rot_lex ;
      ontolex:denotes   <http://www.oeaw.ac.at/acdh/compound#
            https://www.wikidata.org/wiki/Q1827> .
```

Example (1) displays the Ontolex encoding for the compound word “Rotsperre”. Important in this example is that we can represent the fact that the entry is consisting of 2 components (:Rot_comp and :sperre_comp), which correspond to two entries in the generic German lexicon. Examples (2) and (3) below show the encoding of those 2 components and their linking to their corresponding lexical entries by the use of decomp:correspondsTo property[7]:

```
(2) :Rot_comp
      rdf:type decomp:Component ;
      decomp:correspondsTo :rot_lex .

(3) :sperre_comp
      rdf:type decomp:Component ;
      decomp:correspondsTo :Sperre_lex .
```

Now we can integrate the MARL vocabulary for marking the polarity of the compound word “Rotsperre” (see Table 1) and its components. As example (4) shows, we do this in the context of the Ontolex sense class[8]. Inclusion of MARL vocabulary is indicated by the use of the “op” prefix:

```
(4) :rotsperre_sense
       rdf:type ontolex:LexicalSense ;
       op:assessedBy :SentiMerge ;
       op:hasPolarity op:Negative ;
       op:maxPolarityValue "1.0"^^xsd:double ;
       op:minPolarityValue "-1.0"^^xsd:double ;
       op:polarityValue "-0.628"^^xsd:double ;
       rdfs:label "Sense for the German word \"Rotsperre\""@en ;
       ontolex:isSenseOf :Rotsperre_lex ;
       ontolex:reference          http://de.dbpedia.org/resource/Wettkampfsperre
```

In a generic lexicon we see that the word “Sperre” has different meanings, one of them being in line with the sense of “Rotsperre”, sharing thus the same ontological reference: http://de.dbpedia.org/resource/Wettkampfsperre (*suspension from a competition*). The corresponding sense of the word “Sperre” is displayed in example (5):

```
(5) :sperre_sense2
      rdf:type ontolex:LexicalSense ;
      op:assessedBy :SentiMerge ;
      op:hasPolarity op:Negative ;
      op:maxPolarityValue "1.0"^^xsd:double ;
      op:minPolarityValue "-1.0"^^xsd:double ;
      op:polarityValue "-0.777"^^xsd:double ;
```

[7] See the Decomp module graphical representation in the Appendix

[8] See the Ontolex graphical representation in the Appendix.

```
rdfs:label "A sense for the German word \"Sperre\""@en ;
ontolex:isSenseOf :Sperre_lex ;
ontolex:reference <http://de.dbpedia.org/resource/Wettkampfsperre> .
```

The adjective “rot” (*red*) in SentiMerge is marked as neutral (has polarity value “0.0”), and so we can see that the polarity value of the word “Rotsperre” is in the range of the combination of the polarity values of “red” and “Sperre2”.

Looking now at an entry of the DBÖ: “(Stall)rôt:1”, in the field of colour terms. We first get an indication that we are dealing with a compound word, a fact indicated by the use of the parentheses. And the second component of the word is a colour term (*red*). The first component is “Stall” (*stable*, a place for keeping animals, like cattle). This word is not in our lexicon for standard German. But the components of the word are in our polarity lexicon. For both components we find that they are marked as being neutral. But the definition of the word “(Stall)rôt:1” is giving us the information that it is about a *cattle disease* (“eine Krankheit des Hornviehs”). And diseases of animals (the entry: “Tierkrankheit”) is marked with the value “-0.897” in SentiMerge. Therefore, similar to example (4), the DBÖ entry “(Stall)rôt:1” can be enriched with the information displayed in example (6), where we specify that the op:polarityValue is the one we get from the corresponding entry in SentiMerge “Tierkrankeit” (*animal disease*), being “-0.897”:

```
op:assessedBy :SentiMerge ;
op:hasPolarity op:Negative ;
op:maxPolarityValue "1.0"^^xsd:double ;
op:minPolarityValue "-1.0"^^xsd:double ;
op:polarityValue "“-0.897"^^xsd:double ;
```

Interesting in this context is the fact that the value of the polarity of the compound word does not reflect the combination of the polarity values of the components of this word, giving us a hint that the usage of the word is only indirectly or metaphorically related to a colour term. As a matter of fact, all terms pointing to a colour as such are marked as being neutral.

4 Conclusion

We presented in this submission on-going work dealing with the extension of a dialect dictionary with polarity information that can be gained both from a specialised standard German polarity lexicon and from the interpretation of definition of headwords of the dialect dictionary. We described how we encode all this integrated information using formal models for lexical data and for polarity information, supporting thus the future publication of the extended dialect dictionary in the Linked Data cloud.

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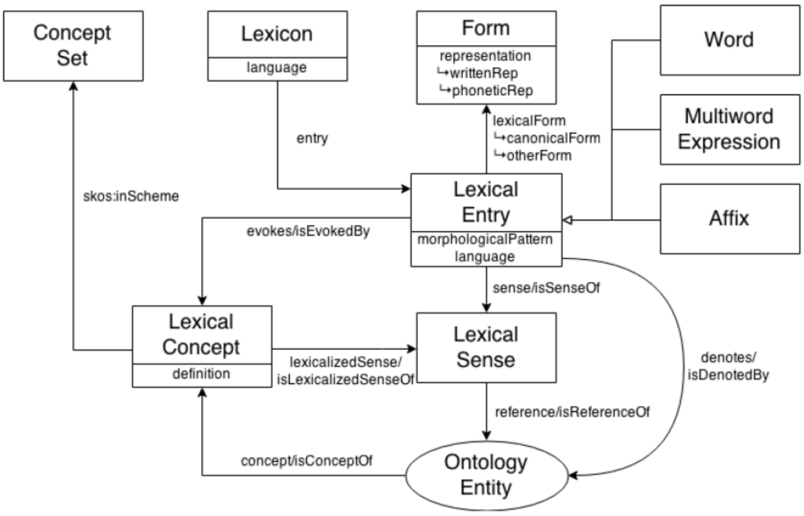
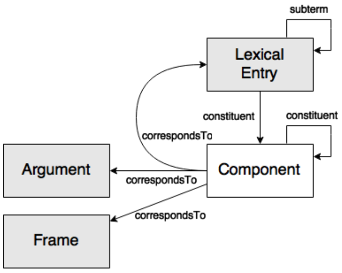
Appendix

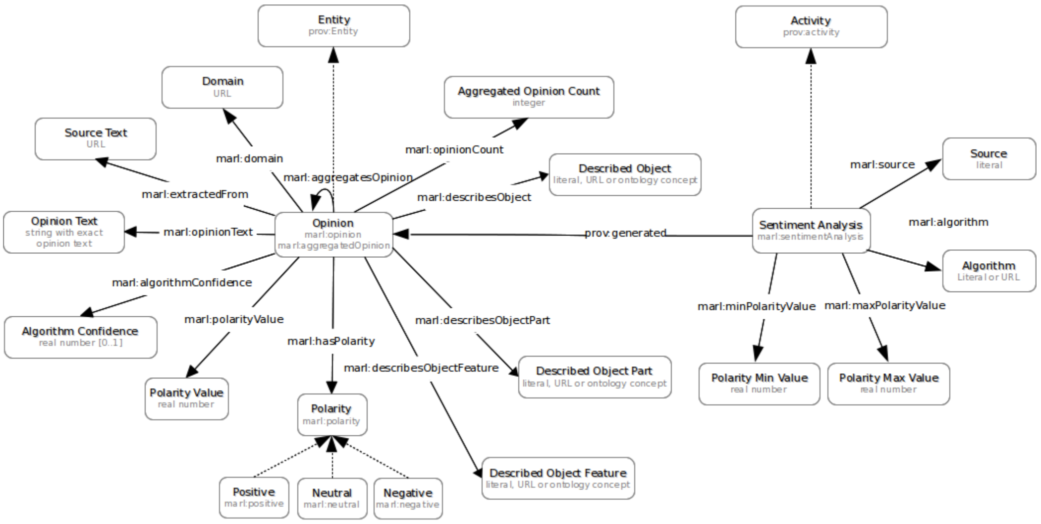
In this appendix we display the graphical representations of Ontolex, of the Decomp module attached to Ontolex and MARL



The core model of OntoLex. Figure created by John P. McCrae for the W3C Ontolex Community Group



The relation between the decomposition module and the lexical entry of the core module. Figure created by John P. McCrae for the W3C Ontolex Community Group.



The MARL Model