



Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 112 (2017) 288–295

Procedia
Computer Science

www.elsevier.com/locate/procedia

International Conference on Knowledge Based and Intelligent Information and Engineering Systems, KES2017, 6-8 September 2017, Marseille, France

Enriching learning materials with semantic roles

Diana Trandabăț*

University Al. I. Cuza of Iasi, Romania

Abstract

One of the most challenging tasks in human-computer communication is the decomposition of meaning. The theory of semantic frames allows for the identification of the roles that various constituents have in an event: the doer of the action, the receiver of the action, the person towards whom the action is directed, the means and purposes of an action, etc.

Through this paper, we propose to introduce semantic frames in eLearning contexts, with the conviction that users may find it easier to learn concepts if they are offered in a semantically related manner. In order to achieve this, we propose a system that, for every concept searched by the user, offers a network of concepts, by analyzing the semantic relations which appear between concepts.

In other words, the proposed system starts with a concept, retrieves sentences containing it from the collection of learning materials and identifies the semantic relations between the considered concept and the ones found in their neighborhood using semantic role labeling. Additional information is completed using DBpedia's knowledge base before establishing the final network of relations.

© 2017 The Authors. Published by Elsevier B.V.
Peer-review under responsibility of KES International

Keywords: semantic roles, e-learning, information extraction

* Corresponding author.

E-mail address: diana.trandabat@gmail.com

1. Introduction

Although language technologies are widely used in our everyday life, a recent study in the series “Europe’s Languages in the Digital Age” [13] showed that the support for developing linguistic resources and natural language applications in various European countries is yet insufficient.

In an age in which machines learn to understand texts and humans collaborate with each other more easily than ever, we propose to boost the eLearning paradigm by enriching learning materials with semantic relations. The significance of this research theme comes from the constant need for personal and professional improvement and the dynamism and dimensions of data considered learning materials, as well as from the diversity of learning styles.

The paper is structured in 5 sections: Section 2 provides a brief overview of the present state of the art in recognizing semantic roles, Section 3 exposes the main architecture of our system, while Section 4 discusses the evaluation of our application, before drawing some conclusions and drafting further directions.

2. State of the art

Linguistic theory considers that semantic relations may have been identified thousands of years ago, through Panini’s karaka theory [8] of enhancing morphology with semantics. Despite their long history, semantic roles have not managed to fit into only one category, different variants of classifications being recorded, ranging from more particular or verb-oriented to rather general, most of them with proven efficiency in various practical implementations.

There has recently been a growing interest in more in-depth semantic analysis for practical Natural Language Processing tasks (NLP), in particular as a basis for open-domain information access. As [1] show, NLP systems gradually stopped relying so much on word-based techniques and started to exploit semantics. Therefore, applying semantic frames to NLP is in line with actual trends in the field.

Semantic roles allow the identification of various roles played by concepts in different contexts, as well as the circumstances in which events take place, contributing to the construction of meaning. Semantic roles express the context of a sentence in terms of the relations between concepts; they can define who the doer of the action is, for whom is the action performed, through which means, at what time and with which goal. Semantic roles are annotated for predicational words.

Predicationality is a lexical feature, equally identified in nouns, verbs and even adjectives, their meaning evoking an event or process, corresponding to what in the literature is called the deverbal property, or the deverbality of these categories [3].

A word is considered to bear the predicationality feature if it needs a semantic role structure in order to reveal its meaning. While most verbs are predicational, there exists a set of state, auxiliary or support verbs which do not express a semantic role structure.

```
I [could] go.  
I [inclined] to like you.
```

On the other side, several nouns can have a predicational behavior, demanding a role structure, such as the predicative nominals *explanation*, *decision*, *receiving* etc.

```
I confirm [the receiving] of your documents yesterday morning.
```

To exemplify semantic relations, let’s consider the scenario of an arrest: an authority charges a suspect for an offense. In this scenario, a specific time, place, purpose and probably also some means can also be identified. Among the list of predicates linked to this scenario, we can find the verbs arrest, cop, bust, apprehend, each of them evoking the same scenario.

Manually identifying semantic roles in texts takes time and needs trained experts. A solution is developing automatic role labeling systems through accurate and reliable methods. Automatic Labeling of Semantic Roles is defined as the task of finding semantic elements in a sentence and classifying them with a correct semantic role,

Download English Version:

<https://daneshyari.com/en/article/4960606>

Download Persian Version:

<https://daneshyari.com/article/4960606>

[Daneshyari.com](https://daneshyari.com)