

Controlling Linguistic Coreference in Graphical Interfaces*

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Abstract

We propose mechanisms for linguistic coreference in graphical interfaces. Our mechanisms 1) locate coreference relations, 2) use discourse structure to rank coreference candidates, 3) establish a consensus between the expert and system with regard to coreference relations, and 4) examine ways to represent these relations in the interface.

1. Introduction

Representing the content of a document in a knowledge base (KB) enables documents expressing that content to be generated in multiple languages using the same representation. Usually, building a KB requires an expert in both the knowledge to be contained in the KB *and* the knowledge representation (KR) language used to build it. The WYSIWYM (What You Say Is What You Meant) knowledge-editing method [1], however, allows a domain expert to build a KB without previous exposure to linguistics or KR languages. In WYSIWYM, the expert interacts with natural language, not a KR language, to build a KB that is used for multiple language generation of documents. Coreference is a computational linguistic problem that must be solved for WYSIWYM to function effectively.

2. Problem Description

Building a KB often requires a user to refer to entities that already have a representation in the KB. If the system does not recognize references to the same entity, the KB will be inaccurate, e.g., it might contain multiple objects for the same entity. Since a correct KB is necessary to generate texts with correct referential forms, it is essential that the system and user agree on references to a single entity. We describe mechanisms that allow the system to communicate with a domain expert, who is not an expert in linguistics, to resolve coreference relations. Once resolved, the mechanisms accurately represent these relations in the user interface (UI).

Figure 1 shows a partially specified manual entry in our test domain (vehicle manuals). The user encoded the knowledge that ‘drain hoses’ must be installed [A1]. He may wish to refer to the same ‘drain hoses’ to assert that they must be taped into position [A2]. If the system understands that the two mentions of the drain hoses corefer, it will generate coherent text with correct referential forms.

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[A] 1. Install the drain hoses with some tool by some method.
2. Tape some part into some position by some method.

Figure 1. Partially Specified Manual.

3. Project Overview and Goals

Unlike previous work involving WYSIWYM that has investigated coreference in a small-scale application [2], we use new methods to locate coreference relations and candidates, discourse structure to rank coreference candidates, and a wider variety of linguistic elements to represent coreference relations. Our methods scale better than previous approaches.

4. Coreference Mechanisms for Knowledge Editing

Our coreference mechanisms vary according to the following properties: type interpretation for locating coreference relations and candidates, method used to rank these candidates, and communication style and content of the UI.

Type can be broad and narrow for locating coreference relations and candidates. The broad definition uses general types, i.e. the top of the hierarchy, such as “some part.” The narrow definition uses specific values of broad types, i.e. leaves of the hierarchy, such as “drain hoses,” a type of part. We use the hierarchical discourse structure to rank candidates of the correct type. We investigate two communication styles for presenting coreference candidates: direct manipulation and dialogue oriented. In direct manipulation, the user explicitly specifies coreference relations, whereas with dialogue interaction, the system presents the user with menus from which selections are made. To effectively represent coreference relations in the UI, the system uses two types of elements: linguistic (pronouns and determiners) and artificial (indices and brackets).

5. Ongoing Work and Conclusions

We have built the ontology for the vehicle manuals domain. Generators for authoring manuals have been constructed in English and Spanish. We are implementing our coreference mechanisms and planning user studies to evaluate them.

Bibliography

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