CS 5600/6600: Intelligent Systems
Assignment 9

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November 02, 2018

Learning Objectives

1. Conceptual Dependency
2. Knowledge Representation

Introduction

There is no coding involved in this assignment. I would like to give you some flavor of how Conceptual Dependency can be used to represent meanings of natural language texts and appreciate what a great challenge it is to capture the semantics (as opposed to just syntax) of natural language.

Problem 1 (3 points)

Read the article "Conceptual Analysis of Natural Language" by L. Birnbaum and M. Selridge. A scanned pdf of this article is included in the zip archive. This version is taken from Ch. 13 of "Inside Computer Understanding" by R. Schank and C. Riesbeck. As you read this article, do not puzzle too much over symbolic expressions and Lisp statements in the text. Lisp has changed a great deal since the late 1970's when this article was originally written. Rather, read it for ideas, insights, and inspirations. Try to see the big picture of what the original inventors and designers of Conceptual Dependency were aiming to achieve. Keep your analysis in the context of the two quotes from "Representing Physical Objects in Memory" by W. Lehnert that motivated much of our discussion in Lecture 10.

> Those processes which are most basic and fundamental for people tend to be the processes that are most challenging for a computer. This is largely due to the fact that the more fundamental a process is, the less we know about the cognition behind it. When an activity requires conscious thought (like playing chess or proving theorems) we are able to say something about the cognition involved in it... But when a process is so low level (like recognizing the letter A or remembering your middle name) that there is no conscious awareness of how it is achieved, it is very hard to know where to begin our study. Natural language understanding is one such low level process that cannot be consciously monitored to any significant degree. We cannot introspect about the form of information in memory or the processes which facilitate recognition and generate expectations.
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> ... we must pursue the notion of computational process models for the cognitive

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processes which underly human language comprehension. These computational
processes will manipulate knowledge representations according to precisely
defined algorithms. But neither the information in these knowledge structures nor
the functions which operate on that information have to conform to the laws or
the notational appearance of mathematics as we know it. To assume that our
current knowledge of formal mathematics has exhausted or even touched on all
realms of possible symbol manipulation would be rather narrow minded and
naive.
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Problem 1 (2 points)

Use Conceptual Dependency to represent the meaning of the following sentences. You can follow the examples we worked out in class during Lecture 10.

1. Ann ate a cheese cake.
2. John flew to New York.
3. Mary read a paper and became happy.
4. John bought an old car, which annoyed Mary.
5. John saw Mary and remembered that he had given her a book.

What to Submit

Save your answers in hw09.pdf and submit it in Canvas.

Enjoy Knowledge Engineering!