Semantic Analysis through Ant Algorithms, Conceptual Vectors and Fuzzy UNL Graphs

Mathieu Lafourcade

LIRMM, Université Montpellier II, 161, rue Ada,
34392 Montpellier cedex 5
mathieu.lafourcade@lirmm.fr

Abstract. In the context on the UNL project, we focus on the automatization of enconversion process, that is the building of UNL graphs from sentences. We present an extension of the UNL graph structure aiming at handling lexical and relational ambiguities. On this intermediate structure, we can apply ant algorithm propagation of conceptual vectors and other constraints. Graph nodes and relations have a level of excitement and when this level remains too low for too long they are deleted. This way, both acception and attachment selections can be performed.

1 Introduction

In itself, a text constitutes a complex system, but the computational problem is that the meanings are not strictly speaking active elements. In order to ensure the dynamicity of such a system, an active framework made of "meaning transporters" must be supplied to the text. These "transporters" are intended to allow the interactions between text elements and they have to be both light (because of their possible large number) and independent (word meanings are intrinsic values). Moreover, when some meanings stemmed from different words are compatible (*engaged* with *job* for instance), the system has to keep a trace of this fact. These considerations led us to adopt ant algorithms. Ant algorithms or variants of them have been classically used for optimisation problems like traveling salesman problem [*Dorigo* et al. 1997] among many others, but they were never used in Natural Language Processing (most probably because the NLP community contrary to the psycho-linguistics one, considered semantic aspects not very often as an optimization problem, nor explicitely modeled then as a dynamic complex system, [*Kawamoto* 1993] being a notable exception). However, [*Hofstadter* 1995] with the COPYCAT project, presented an approach where the environment by itself contributed to solution computation and is modified by an agent population where roles and motivations vary. Some properties of these models seem to be adequate for the task of semantic analysis, where word senses can be seen as more or less cooperating. We retain here some aspects that we consider as being crucial: (1) mutual information or semantic proximity is one key factor for lexical activation, (2) the syntactic structure of the text can

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