COATIS, an NLP System to Locate Expressions of Actions Connected by Causality Links

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Abstract. COATIS is an automatic tool designed to locate certain actions expressed in texts. Rules of contextual exploration, activated by the presence of linguistic indicators of causality in sentences, enable COATIS to locate expressions that denote field actions and that are linked by causal relations. COATIS processes technical texts of any domain, in the French language. It is therefore particularly suitable for use in causal knowledge acquisition from texts.

1 Introduction

The notions of transfer, entity and movement, expressed by natural languages, have been extensively studied for instance by Talmy [18, 19], Langacker [14], Jackendoff [11] and Pustejovski [16], but the systematic study of the encoding of causality by natural languages is still in its early stages. Several research studies of systematic description of vocabulary (verbs of movement are analyzed by means of schemas by M. Abraham in [1], semantic transitivity, aspectuality schema and diathesis schema had been studied by J.-P. Desclés in [5], while particular semantic domains such as relations of localisation and whole-part relations were also recently studied and presented in [13] and [12]) have been conducted with the aim to get knowledge from texts without any information about the field described in the processed text.

In this paper, we set out the results concerning the notions of action and causal relations between actions as expressed by verbs of the French language. The model we built is coupled with the Strategy of the Contextual Exploration to obtain the COATIS computer system. This system aims to index the processed text by the actions expressed within it and that are organized by causal links. We start by explaining (Section 2) how we organized the French verbs that express causal links between actions. We then describe (Section 3) the COATIS system.

2 Semantic Organization of Causality as it is Expressed in French

A classic distinction between the efficient causality and the causality that is able to be described by formal representations, has long been established and we take...
it into account. We distinguish between the efficient causality where one action provokes a different action that comes later in time ("Massive deforestation of the planet leads to global cooling"), and the causality that substitutes the notions of cause and effect by regularities encountered between actions ("Energy is proportional to mass"). We extend this distinction with an original work on the organization of the efficient causal relations.

2.1 Efficient Causality as Expressed by French Verbs

The idea of efficient causality as an oriented relation between actions, can be expressed by French verbs. French verbs such as provoquer (to provoke), génér (to disturb), résulter (to result), or conduire à (to lead to), are called indicator verbs of causality (or indicators for short). The indicators that express efficient causality relations can (i) clarify the nature of the produced effect (-disturbing-, -letting-, -modification-, -creation-, etc.), or (ii) clarify the intervention of the causal action (-contribution-, -collaboration-). Figure 1 presents an extract of the model comprising twenty-three specific relations of causality (nineteen relations of efficient causality and four relations of formal causality).

2.2 Efficient Causalities Clarifying the Produced Effect

One causal action can block, impede, influence, create or keep another action. The two relations -blocking and -keeping- respectively extend the relations -impediment- and -keeping-. We note each specific causal relation between two hyphens.