Abstract

In this thesis, the problem of multilingual spoken language understanding is addressed using graphs to model and combine the different knowledge sources that take part in the understanding process. As a result of this work, a full multilingual spoken language understanding system has been developed, in which statistical models and graphs of linguistic units are used. One key feature of this system is its ability to combine and process multiple inputs provided by one or more sources such as speech recognizers or machine translators.

A graph-based monolingual spoken language understanding system was developed as a starting point. The input to this system is a set of sentences that is provided by one or more speech recognition systems. First, these sentences are combined by means of a grammatical inference algorithm in order to build a graph of words. Next, the graph of words is processed to construct a graph of concepts by using a dynamic programming algorithm that identifies the lexical structures that represent the different concepts of the task. Finally, the graph of concepts is used to build the best sequence of concepts.

The multilingual case happens when the user speaks a language different to the one natively supported by the system. In this thesis, a test-on-source approach was followed. This means that the input sentences are translated into the system's language, and then they are processed by the monolingual system. For this purpose, two speech translation systems were developed. The output of these speech translation systems are graphs of words that are then processed by the monolingual graph-based spoken language understanding system.

Both in the monolingual case and in the multilingual case, the experimental results show that a combination of several inputs allows to improve the results obtained with a single input. In fact, this approach outperforms the current state of the art in many cases when several inputs are combined.