A Chinese Interactive Feedback System for a Virtual Campus

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ABSTRACT

Considering the popularity of the Internet, an automatic interactive feedback system for E-learning websites is becoming increasingly desirable. However, computers still have problems understanding natural languages, especially the Chinese language, firstly because the Chinese language has no space to segment lexical entries (its segmentation method is more difficult than that of English) and secondly because of the lack of a complete grammar in the Chinese language, making parsing more difficult and complicated. Building an automated Chinese feedback system for special application domains could solve these problems. This paper proposes an interactive feedback mechanism in a virtual campus that can parse, understand and respond to Chinese sentences. This mechanism utilizes a specific lexical database according to the particular application. In this way, a virtual campus website can implement a special application domain that chooses the proper response in a user friendly, accurate and timely manner.

Keywords: grammar; interactive feedback; lexical database; natural language; segmentation method

INTRODUCTION

The easiest way to communicate to users is to talk to them in their natural language. Considering the popularity of the Internet, an automated interactive feedback system for e-learning Web sites is becoming increasingly desirable. However, it still is difficult for a computer to understand the meaning of some natural languages. At present a three-year old child can understand and respond to languages better than a computer can. To understand the natural language, a computer must be trained to understand a single sentence. Then, it would need to be trained to analyze longer sentences or paragraphs. In principle, there are at least

two skills that a computer should be able to apply to a single sentence**:**

1. Defining the meaning of each word in the sentence.
2. Transforming the linear structure of a sentence into another structure that represents the meaning of that sentence.

The first step of processing a Chinese sentence is seeking the meaning of each lexicon in a dictionary. However, there can be many meanings for each lexicon, and the computer must have the ability to choose the right one. Even if that is accomplished, it is still difficult for the computer to process the Chinese sentence because there are no spaces used to segment the lexicon. Therefore, a segmentation method is needed before parsing the Chinese sentences.

The second step of understanding a Chinese sentence is transforming the segmented lexicons into a structure that can be understood by a computer. In general, the transformation procedure can be divided into three parts:

A. Syntactic analysis procedure: In this procedure, the input lexicon is transformed into a specific structure that represents the relationship between lexicons. However, not all the combinations of lexicons of a sentence are legal. The computer must eliminate the illegal combinations to ensure a correct performance.
B. Semantic analysis procedure: This procedure obtains the meaning of the sentence from the established structure. The obtained meaning is a unit of knowledge representation, which can be mapped to the corresponding object or event in the actual world.

C. Pragmatics analysis procedure: This procedure determines the real purpose of the sentences and gives the appropriate response to users.

The remainder of this paper is laid out as followed. The next section discusses the related works on syntax and semantic analysis, followed by a description of the proposed four subsystems of segmentation, syntactic analysis, semantic analysis, and the response subsystems. The next section provides some examples to show the implementation of the proposed method. Finally, there is conclusion and some future works.

REVIEW OF RELATED WORKS

Link Grammar Technology

Most sentences in a natural language are structured so that arcs that connect words may not cross each other. This phenomenon is called planarity in the link grammar system (Sleator & Temperley, 1991). A link grammar consists of a set of words and has a linking requirement. The linking requirements of each word are contained in a dictionary. To illustrate the linking requirements, Figure 1 shows a simple dictionary for the words "a," "the," "cat," "mouse," and "chased." The linking requirement of each word is represented by the Figure 1 above the word.

Each of the lettered boxes is a connector which is satisfied when it is "plugged into" a compatible connector, as indicated by its shape. If the mating end of a connector is drawn facing to the right, then its mate must be to its right facing to the left. Exactly one of the connectors attached to a given black dot must be satisfied. Thus, the "cat" requires a D connector to its left

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