ALICE: Acquisition of Language through an Interactive Comprehension Environment*

ALICE: Adquisición del Lenguaje a través de la Interacción y la Comprensión Escrita

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Resumen: Integración de tecnologías del estado del arte en procesamiento del habla y procesamiento del lenguaje natural aplicadas a los asistentes inteligentes para el aprendizaje de lenguas. El objetivo es mostrar que el nivel de madurez de la tecnología permite que sea aplicada al aprendizaje de segundas lenguas en secundaria.
Palabras clave: Interacción hombre-máquina, Aprendizaje de Lenguas

Abstract: Integration of several state-of-the-art technologies related to spoken language and natural language processing used in Intelligent Computer Assisted Language Learning (ICALL) systems. We envision to show that the technology has a level of maturity that suggests that the time may be right to use it at high school.
Keywords: Human Language Interaction, ICALL systems

1. Introduction

This work is motivated by the Spanish education failure reported by the Program for International Student Assessment (PISA). This report is conducted by the Organization for Economic Co-operation and Development (OECD), which is responsible for standardized testing for 15-year-old students.

The opinion of experts has been considered crucial to correctly identify how to apply technology to solve this problem. For that reason, the Chair that Telefónica has at UPC organized and sponsored a meeting with all the agents involved in the Education system. The chair goal was to promote the use of speech and natural language processing technologies in the educative process.

The objective of the meeting was i) to detect and identify educative needs as well as technological restrictions and ii) to lay out a pilot to be carried out by the end of April. More specifically, the main effort was focussed on how to apply existent language technology for second language learning.

2. Application Framework

Some state-of-art tools were candidates to help to improve various aspects of oral and written communication. These tools were presented to members of the involved agents (educators, technologists, editorials and administration).

The audience shared their knowledge and experience to create a language learning environment to carry out a pilot experience. The general testing scenario consists of a virtual English language learning assistant.

The pilot test was raised with several high school groups during the month of May.

3. Integrated Technologies

The proposed framework, provides a learning environment for training fluent and expressive reading with the objective of comprehension training and assessment.

The activity consists of several tasks; each demonstrates the use or the application of a specific technology for addressing the main goal of the activity.

Details about each specific technology are reported in the following subsections.

3.1. Virtual Learning Environment

The activity has been designed and integrated into the Moodle 1.9 virtual learning environment.

The current implementation of this activity consists of five separated tabs, each linked to the specific URL that contains the particular implementation of a task: listening, speaking, reading, grammar and writing.

3.2. Guidelines

The activity starts showing to the user the guidelines of the learning exercise. The guidelines are an interactive flash movie[1] that shows the control buttons of each task and explains in native language the goal of each task. The spoken messages have been produced by the speech synthesizer implemented by the Verbio Company[2].

Additionally, ALICE plays a short description of the current task when the specific task tab is active. The language used for these short messages is English and they have been recorded using the synthesizer described in section 3.3.

3.3. Listening Task

The listening task is the first touch of the student with the text. The text is presented in separated paragraphs and with the aim of helping in the comprehension process, images are added near to the text of each paragraph.

The students are requested to select part of the text and listen the pronunciation of the words as spoken by the synthesizer. A punctuation score is given to the student at the end of the task, which is related to the number of listened words. The system gives extra-points when any of the words considered difficult to pronounce has been listened.

We have integrated the Text-To-Speech Enabler synthesizer developed by Ericsson and published at the Ericsson Lab site[3].

3.4. Speaking Task

In the second task of the activity, students are required to read a piece of the text, record their own speech and listen to their selves.

The goal is that students can compare the pronunciation of any word and learn the phonetics of the language by practicing a set of examples. Ideally, the students read longer phrases or even a whole paragraph to learn some prosody.

A Java Applet developed by Javasonics[4] has been integrated to be used to record voice and upload it to a web server.

3.5. Reading Task

The goal of the Reading task is to estimate the student's oral reading fluency. We have integrated the FLORA BLTek[5] web-based system. FLORA presents grade-level text passages to children, who read the passages out loud, and computes the number of words correct per minute (WCPM), a standard measure of oral reading fluency.

The integration allows connecting the client with the web service at the offices at Boulder Colorado and, at the same time, controlling the interaction and logging data at our servers.

3.6. Grammar Task

The main goal of the grammar task is to practice one or more aspects of the English grammar. In this task we have integrated a WERTi[6] extension for the Firefox browser. WERTi is an ICALL system designed to provide supplementary language learning activities using English texts selected by the user.

In our particular activity the student is required to do a specific grammar exercise that consists of seeking and clicking on the target words (e.g. preposition) in the text. The punctuation of the task is a F1-score of the hits and the fails.

3.7. Writing Task

The last task of the activity consists of chatting with a dialogue system. The main goal of the task is to assess the comprehension of the text. The system asks to the student questions related to the main theme of the text. However, the answer cannot be often answered by taking a piece of text. The system analyzes the student's answer and takes different actions depending on their content.

We have adapted a plan-based dialogue system[7] to drive a conversation with the user. The plan for the dialogue consists of several paths with different actions in a way that all the paths achieve the end of the plan. So, the conversation has several variations depending on the content of the student's answers.

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[1] http://nlp.lsi.upc.edu/catedra_log/Flash/instruccionsPilotMaig/

[2] http://www.verbio.com/webverbio3/html/demos_ttsonline.php

[3] https://labs.ericsson.com/apis/text-to-speech/

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[4] http://www.javasonics.com

[5] http://www.bltek.com/flora/

[6] http://sifnos.sfs.uni-tuebingen.de/WERTi/

[7] http:nlp.lsi.upc.edu/digui