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Intelligent Computer-Assisted Language Learning (ICALL) Software for Self-Learner on the Open Web

Research Questions

How to structure a "platform-less" (from the point of view of the learner) CALL system for browser users? What model of student knowledge can be used for relevant language learning recommendations?

Context

The emergence of personal computer and the World Wide Web have crossed path of language education. It has given birth to the development of Computer-Assisted Language Learning systems (CALL) and Intelligent Tutoring System (ITS). They both aim to help students improve their foreign language skills with the help of automated tools and new media. Various CALL systems have been developed for the four language competencies (reading, writing, listening and speaking) with more systems focusing on vocabulary [Gamper and Knapp, 2002]. A lot of these learning platforms are available as a web portal. Recently the subfield of Mobile Assisted Language Learning (MALL) has also emerged: it explores the usage of mobile devices such as PDAs and smartphones to reach the goal of supporting education in broader contexts [Bozdoğan, 2015].

In the absence of a human instructor, one of the key challenge of CALL software is their adaptation to the learner. Some studies address the point with a Student Model, which is a component for tracking student's level and progress. Some works include the level related issue in the broader perspective of a "context aware" system; that is a system that can keep track and make use of data such a location and time. Moreover Educational Data Mining (EDM) can be done in theses controlled platform to learn more about student behavior and improve learning experience.

Problems

Two problems emerge from the current state of the art. First, some key areas such as level determination are often not automated. For example, the CAMLES system proposed by [Nguyen et al., 2010] asks the user to input their level by themselves. Furthermore, the learner level is usually is not fine-grained (CAMLES use a five level scale modeled as an integer). Another area that heavily relies on human is educational content creation: content is created by human or relies heavily on human-crafted ontologies.

Secondly, the current approach forces learners to use a given web portal with the underlying assumption that they are willing to use it. That may not be true, especially in the long run. Some studies like [Li et al., 2009] evaluate student interest in the tested system as part of its effectiveness review but large-scale user engagement in the long run is yet to be demonstrated.

Intended Approach

An idea to address the engagement issue is to build a system for learners to use where they already are: the open Web. The commercial browser add-on Rikaichan[1] that assists users with a Japanese dictionary on any web page

[1] https://addons.mozilla.org/fr/firefox/addon/rikaichan/

took this path and totalized more than 40K downloads; but it lacks intelligent features. I propose to address this situation by architecting an ICALL system built for the open web.

The system should also address the problem of using a detailed student knowledge model. We will investigate the use of lexical networks for the student model and the structure of a given natural language. Student model is a subgraph of the language model. By acquiring and comparing data from all users of the system, we can improve each student models for example by introducing fuzziness while making more precise recommendations for a given cluster of learners.

Details

The system is built on the classical client-server architecture. The server part listens for navigation logs of a user send by the client. It then makes use of natural language processing (NLP) software to analyze the page content. Result is used to refine both the language model and the student model. Information about student's interest and its probably known words network are updated. Computations such as clustering algorithms are performed by the server to improve its models and refined its recommendations. The whole architecture should be modular to add, replace, delete and test different modules for each for the previous mentioned tasks.

On the client side, vocabulary, grammar points or cultural knowledge recommendations are done in a non-intrusive way. The application shell (most likely a browser extension) includes other helping tools such as dictionaries. Usage of these tools is monitored to get additional analytics in order to build and improve the student model. Explicit placement test may be offered.

Impact

In a world globalizing more quickly than ever, mastering one or more foreign tongues have become a mandatory skill. However, it takes years and hours of extensive reading to build fluency in a foreign language. Lowering the entry bar in reading texts by providing supporting tools and relevant proactive recommendations adapted to the learner can thus reduce the time needed to reach a given level. Helping self-learners to build-up their language skill by themselves during an activity they already are doing daily – web browsing – can reduce education costs, improve population proficiency level and smoother international business and relationships.

References

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