Prepare for Bilingualism Exam with a PDA in your hands

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Abstract

In the recent years the importance of utilizing new technologies in education is permanently growing. The field of mobile learning is exploring the use of small mobile devices for teaching and studying. In this paper we present an ongoing research on mobile language learning, carried at the University of Trento, Italy. Our system is called Mobile Eldit and is designed to be used as an additional tool for the preparation for the exams in bilingualism in the South Tyrol region. We describe the system architecture and the first observations done with a prototype.
Keywords: Mobile Language Learning Prototype

1 Introduction

One of the recently widely discussed fields is the one of mobile learning (or m-learning) where different mobile devices are used for educational purposes [4].

The system we developed at the University of Trento is called Mobile Eldit. The project explores the use of mobile devices, namely PDAs in the language learning domain. Mobile Eldit is based on the Eldit (www.eurac.edu/Eldit) – an innovative online electronic language learning system. Eldit [1] consists of two main data streams – words corpus (learner's dictionary) and texts corpus with comprehension questions. The learner's dictionary might be used by anyone interested in studying Italian or German language. The texts corpus is particularly suitable for people preparing for the exam in bilingualism in South Tyrol, Italy. Mobile Eldit targets only the users preparing for the mentioned exam. Further the paper describes the system architectures with its modules and how they interact (Sec. 2) and the first observations done with a prototype (3).

2 System Design and Architecture

Mobile Eldit is designed with the idea to be used as an additional tool for the preparation for the bilingualism exam. The users were expected to be self motivated grown-up people without need to be supervised and guided in their studies. Some users might be following special courses for exam preparation and it is very probable that the student will use other supporting materials.

One of the objectives during the development of mobile Eldit was to support both online and offline delivery of learning materials from mobile devices (PDAs). We also aimed at reusing already available Eldit data and at keeping the user experience over the mobile system similar to the one accessible on desktop PC version. After analyzing different possible solutions we generalized the architecture so that it can be applied to different e-learning environments and learning objects that should be accessed from mobile devices [2].

The system we developed consists of a server part and a client-side proxy. The role of the proxy on the mobile device is to catch the browser requests and to retrieve the data from the server (if connected) or from the local cache, (if no connection is available). It should also handle cache misses during the disconnected periods. In fact not all data can be stored on the relatively small memory of the PDA. In case of cache misses the system should return a meaningful message to the browser, explaining the unavailability of the content. Additionally the proxy should track the user during his study, i.e. it should keep a log file with what and when the user viewed. These logs should be uploaded on the server at the next connection for further processing. Finally all the cache fill-in and update operations should be maintained by the proxy on the client device.

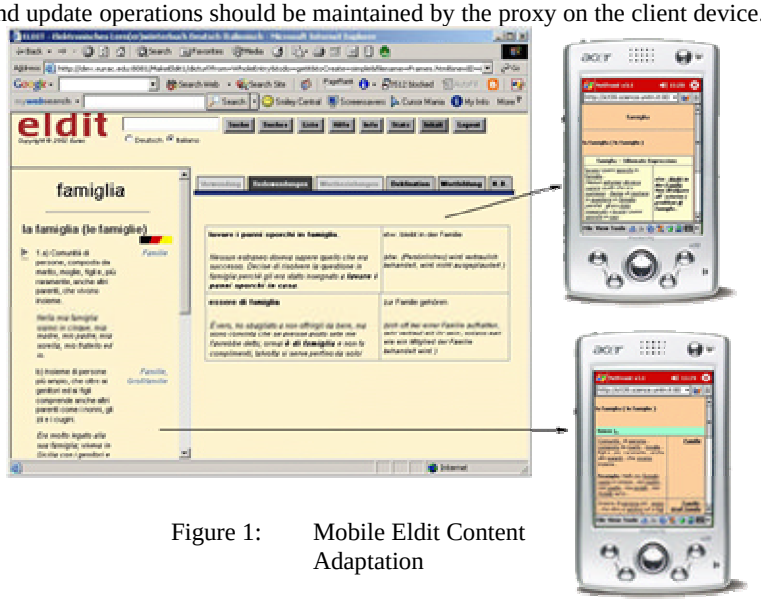

Figure 1: Mobile Eldit Content Adaptation

On the server side the content is redesigned in a form that is suited for the mobile device. The identification of the mobile device characteristics might be done based on the HTTP request, redirected by the proxy. Our content is in XML format and the redesign to simple HTML pages viewable by the limited device browser is done using XSLT transformations on a cocoon server (http://cocoon.apache.org).

Another important functionality that sits on server side is the user behaviour analysis and content pre-fetching for offline usage, a process called hoarding. Hoarding is needed because in general case the study content might be much bigger than the available PDA memory, which is the case with Eldit data.

3 Practical Experiences

Our first experiments started in July 2004. One iPaq3800 and two Acer n10 were given to people that wanted to study Italian language or to prepare themselves for the bilingualism exam. Up to now 10 users participated. Eldit data set contains about 800 texts each with about 150 words and comprehension questions that the user should answer in the other language. Nouns, verbs and adjectives are linked to word entries with rich explanations, translations and additional data. The users were given a PDA with already uploaded a limited set of texts both in Italian and German language, from two difficulty levels thematically grouped. A short (not more than 15 min.) explanation was given to everybody about general use of PDAs and the Mobile Eldit prototype. The users were encouraged to read what they found suitable. Later on their request new data sets were uploaded on the device. At the end each user filled-in a questionnaire for evaluating the system. Here are some of the outcomes:

- Ease of use – all users found the system easy to use especially because of the browser interface which they were familiar with (all users had good computer skills). People that used PDA previously needed no introduction. Some of those who were using it for the first time were initially afraid about the effort needed for getting started with the new device, but after a few hours of usage they felt familiar enough with all needed functionalities.
- Availability and freedom – the users mention as one of the biggest advantages of such mobile learning system the possibility to have it anytime, anywhere with you. The device is small and light and it can contain enough content to be used in different places. All participants were using the system before or after work hours at home or during waiting-times, for example in the train while travelling to work or on the coach “because it is comfortable”. Some people liked the possibility to use the online Eldit system from their work desktop PC, but mainly as a dictionary.
- Fast access – as mentioned above the system consists of texts where the most of the words are hyperlinked to the word entry (translation, examples, explanations, etc.). This makes the needed data accessible very quickly by the user compared to the time needed to find those words in a paper dictionary or other resource. It should be mentioned that is important to

connect every word with the exact meaning in the context used in the text, which is quite a difficult task, but is substantial for the learner.

- Additional materials – people that were preparing themselves for the bilingualism exam generally used additional materials, e.g. a study book or they were attending special preparation courses. An important observation was that they prefer taking paper notes, because it helps them to "remember better". Even when tools for digital notes taking are available on the mobile device the users consider paper notes to be more efficient. On the other hand people that were studying the language without the goal to take any examination were not generally using the system as the only source of *'learning content'*, but were practising their skills by reading books, newspapers, magazines or listening to radio or TV in the targeted language.
- Periods of usage – time of each session varied from one user to another and ranged mainly from five to forty-five minutes. It strongly depends on the student goals – students that intend to take the mentioned exam spend longer periods for systematic and concentrated studying with the system, while the ones that study for their own use it in shorter periods, even if their concentration might be decreased in the moment.
- Number of texts per session – also strongly related to the user goal to pass exam or not, the number of texts read in one session varies from one to more than five. Generally the first group of users read one text per session, spending between 20 and 45 minutes on a single one. On the other hand the second group spends less time on a single text and reads more than one text per session.
- Preferred language and level – students not preparing for the exam tend to read texts in the target language with not very strong preference on the level, while students that prepare for the exam read texts in both languages, as it will be on their test, and concentrate on the level they aim.
- Consecutive browsing – an interesting observation was made on the consecutiveness of learners' access to the materials. Besides the first access to the system, when the focus is on exploring the systems possibilities and limitations, all users were showing quite a consecutive browsing behaviour. Despite the fact that the texts that were not consecutively connected but just listed in thematic groups, users were almost always following the links in the order they were put.

Besides the observations discussed above, we came upon some problems, connected with the use of mobile devices, which we find important to share.

- Battery - one of the biggest problems that we run into is that the battery on Windows based PDAs discharges very fast and discharges even when the device is not used (e.g. is kept switched off for few days). After the device fully discharges all user data and user installed applications disappear. This 'problem', though explained in the PDA's user manual was surprising and frustrating for the users.

- Special characters - from development point of view we had the problem of using special German and Italian letters, which were not correctly displayed in the browser.
- Slow transfer – we have observed a very slow transfer between the desktop PC and the mobile device. This is in part due to the fact that we use a big number of small files, and could be mitigated by packaging of the data into bigger chunks. The slowness of the serial communication channel on which data are transferred to the PDA remains however a major problem.

4 Conclusions

We have briefly presented a system called Mobile Eldit – a PDA accessible language learning system being developed at the University of Trento. It offers offline access to the learning content provided by the Eldit system, redesigned for the limited browser functionalities of the mobile device. We outlined the architecture and the interaction between different modules of Mobile Eldit, and presented our practical experiences with the first prototype, presenting main advantages and problems. The main direction of our research is to try to solve the hoarding problem [3]. Our goal is to support the automatic selection and pre-fetching of learning content on the mobile devices' limited memory. This task involves deep analysis of user's behaviour, common patterns, particularities and etc. The current experiment has the objective of collecting a real data about the user learning styles, habits and preferences and later tests will be done to compare the effectiveness of different algorithms that can be used for the automatic hoarding.

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