

Developing Mobile Application for Learning Japanese Language - FONJAPGO

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Miloš Milutinović¹, Dušan Barac¹, Marijana Despotović-Zrakić¹,
Aleksandar Marković¹, Božidar Radenković¹

¹Faculty of Organizational Sciences, University of Belgrade

This paper presents a mobile application for learning the Japanese language – FONJAPGO. The application is developed on the Android platform for mobile devices. Here are described the architecture and the basic components of the application. The key FONJAPGO application's features include: learning words and scripts in the Japanese language, audio recordings for supporting word pronunciation, achievement testing quiz, the idiogram drawing drill, knowledge competition among the application's users, as well as a presentation of certain interesting facts about Japan. We present practical examples of using the FONJAPGO application in learning the Japanese language.

1. Introduction

Mobile learning allows for an access to information and learning materials at any moment, by using mobile devices [1]. Thus students are in a position to control the learning pace and the location at which they study. The prevailing definition of omnipresent learning is the following: "learn any place, any time" [1][2]. Mobile learning is a form of e-learning implementing wireless technologies to deliver learning contents and secure support [1][3]. Using a mobile device in a learning context allows the students to learn anywhere, at any time [4][5][6]. Accessibility to the Internet allows for a fast communication with other users, while the GPS functionality makes it possible to access the contents relevant for the learning goal linked with a particular learner's location. The increase in the flow allows for combining different media types (video, images, text and sound) [1] [2] [7].

Implementation of modern technologies in the field of foreign language learning makes it possible to access a multitude of available contents in the form of books, dictionaries, literature in foreign languages, as well as various multimedia resources, audio and video files. Innovative methods of information presentation and imaginative forms of interaction with the user, the implementation of the learning concept based on games are interesting to even not so motivated users [8]. A variety of learning activities and resources could be used to accommodate different learners' characteristics [9][10].

The subject of this work is the development of an Android application to support the Japanese language learning in an innovative and interactive manner, through playing games, primarily learning while moving, anywhere and anytime. The purpose of the application is to facilitate the learning process by presenting smaller learning units that can be accessed at any mo-

ment. Simultaneously, one goal is also to help the user adapt to the specific features of the Japanese language reflected in complex scripts and find ways to additionally motivate the user. Also evident is the problem in equivalent applications for language learning that are generally fixed to one language, therefore a further requirement was set that the application should be devised as multilingual. The development employed all hardware and software advantages and the capacities of modern mobile technologies and solutions.

2. Mobile applications for foreign language learning

Research have shown that well designed mobile applications exert a motivating effect on language learners and generally offer enough studying opportunities in order to create a positive impact upon the learning process. Their value in enriching the formal language learning at school is beyond doubt. It has also been proven that providing an opportunity to learn in an informal environment increases the amount of time the students invest in learning [11]. Foreign language learning solutions employing modern technologies can be classed into three categories: desktop applications, on-line applications, mobile applications.

Desktop solutions can be viewed in a small number of voluminous and high quality professional language applications designed by enthusiasts. Characteristic of these voluminous solutions is that they require an absolute user's commitment and a large amount of time to cover the language lessons. On-line solutions are devised on the networking and user-connecting principles. One interesting approach is combining social networking sites with language learning where users are guided towards helping one another in the learning process. A general tendency is to make use of the products of the

users themselves, i.e., to involve the users into the process of creating and then exchanging various language resources. The advantage of the mobile solutions is in the mobility itself, since at any moment they allow for easy learning or give support to serious study using some other tool (in a language school, using regular literature, using desktop applications, etc.). Today, there is a tendency towards a convergence of all the listed solutions. Desktop applications increasingly rely on the Internet to provide language resources and link their users; the on-line solutions, in accordance with the tendency to store the applications into a cloud, become capable of substituting the desktop applications, their advantage being that they are available at all the platforms; finally, mobile solutions are developed alongside the platforms they are intended for and become ever more complex, drawing on the Internet connectivity that becomes a standard for mobile devices.

Some examples of successful applications for language learning are the following: MEL-application – learning the English language through a succession of activities on a mobile device (lessons, video and audio materials, quizzes, memory games) [11]; Mobile Flash application FML4ESL – material divided into mini-lessons, application developed, resolution 240*320, does not conform to larger screens, lessons accompanied by audio recordings and flashes [12]; PIMS (Personalized intelligent mobile learning system) – in combination with a personalized system for vocabulary building, application for study aid, used in combination with classic classes [13]; PAL-LAS – the system of using mobile device systems made possible through client application, mobile browser or by SMSs; language activities include tests, exercises, dictionary that is browsed manually and the activities that trigger in dependence on the context parametres [14].

2.1. Technologies in mobile application development

The technologies implemented in developing mobile applications should be viewed from a number of perspectives: services, devices, platforms, languages in application development, method of wireless communication, types of images, types of multimedia contents. More detail on these technologies can be found in [1][2].

The FONjapGO application, developed in the scope of this research, is designed on the Android operating system for mobile devices. Today, Android OS is an operating system with the largest number of users in the world. A large number of research works deal with the development and implementation of Android applications in various spheres of human activities [15]. The Android OS supports a host of different technolo-

gies and resources in a way similar to regular desktop operating systems, allows for an opportunity for the development of a high quality user interface via a "touch-screen" screen.

The main advantages of the Android platform primarily refer to: the platform openness to programmers, components available for a simple interaction with the system, a wide spread of Android devices and the presence and development of other types of devices, besides mobile phones, that use the same platform, the "touch-screen" and "multi touch" technologies, connectivity, rich user interface with a variety of elements, data storage in different formats, message exchange, multimedia resource support, multitasking.

3. FONJAPGO application description

The FONjapGO application has been developed in the Electronic business laboratory, Faculty of Organizational Sciences, University of Belgrade. The basic role of the FONJAPGO application is to support the Japanese language learning in an interesting, interactive manner, via mobile devices, in order that the students be motivated to learn. The application is completely adapted to specific features of the Japanese language, it includes a Japanese word base and an appropriate base of translation equivalent words that can be in any of available languages. The basic learning process is conducted through the sessions where the student is assigned a task to learn a number of new words and then his/her achievement is tested through a quiz. Besides, the user can test his/her knowledge via lists of words categorised on the basis of a certain criterion, whereas to learn some of the scripts he/she has available all the idiograms of hiragana/katakana scripts and a number of kanji, as well as their individual presentations. To practice notation, quizzes for kana and kanji idiograms are supplied, as well as a possibility to write on the screen, using the "touch-screen" option. Figure 1 presents the basic functionalities of the FONjAPGO application.

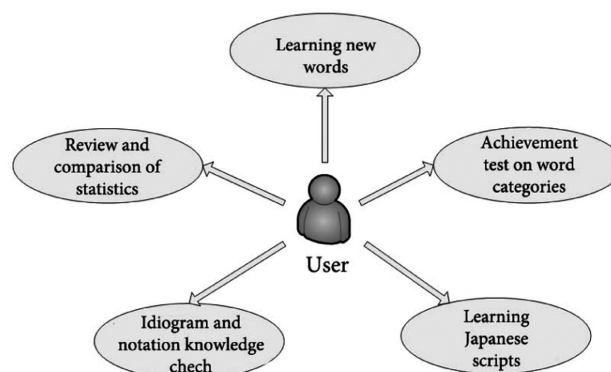


Figure 1. Presentation of basic functionalities of FONJAPGO application

3.1. Application architecture description

The FONJAPGO application consists of two sections: the application in a narrow sense (Android application) and the web application that serves to file the

user statistics and to compare the user's knowledge with other users' achievements. The three-layer architecture of the application is shown in Figure 2.

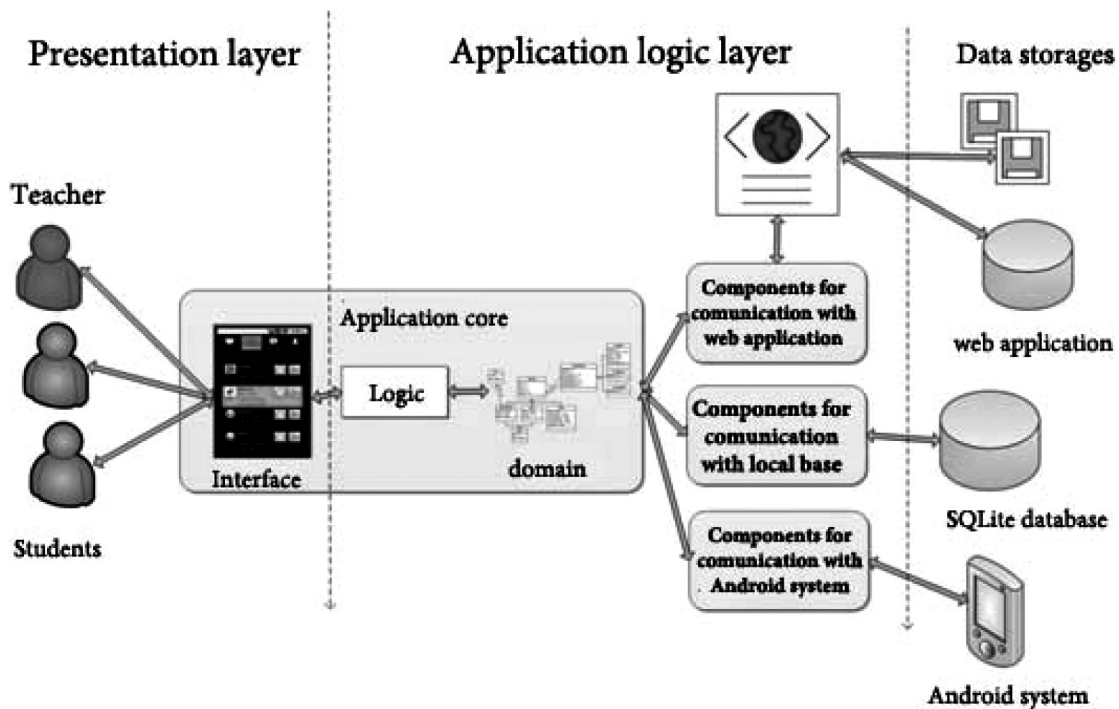


Figure 2. FONJAPGO application architecture

The presentation layer is devised on the basic elements of user interface within the Android OS. The dynamic interface provides for an easy use of all the functions within the application. As the process itself does not require any specific elaboration in the domain of business logic but is based on a quality presentation of language resources and interactivity, the majority of application logic is closely connected with the presentation. The domain objects used in the application present the Japanese/Serbian (or English) words, idiograms of the Japanese script and word lists; all these objects are persisted into the local data base. The words are not stored as word/translation pairs; there are independent notations/objects for the words and for the translation equivalents, which allows for a word to be connected with a number of words in the other language (homonyms and synonyms) and eliminates redundancy in a word base. The application core further draws on a succession of components that link it to the sources/storages of data that contain application data, language resources and user data.

The first of the components is in charge of communication with the data base. The broker of the database

that represents the interface to the base is accessible from any section of the application and is responsible for reading the language resources (words/ idiograms/lists) from the base and keeping records on them. The base is implemented using the SQL system accessible at the Android platform, however, when needed, it can be altered to be adjusted to another platform, with no changes in the core of the application itself necessary.

The second component for communication with the Android system (Figure 3) additionally abstracts the characteristics of the Android platform from the rest of the application and serves to:

- Store simple application data to be saved from session to session (the Android shared preferences system is used);
- Datafiles reading/parsing (from private storage space assigned to each Android application);
- Dynamic image reading;
- Presentation of short messages to the user;
- Provision, temporary storage and releasing audio-clips of words (leaning on the component for communication with the web application).

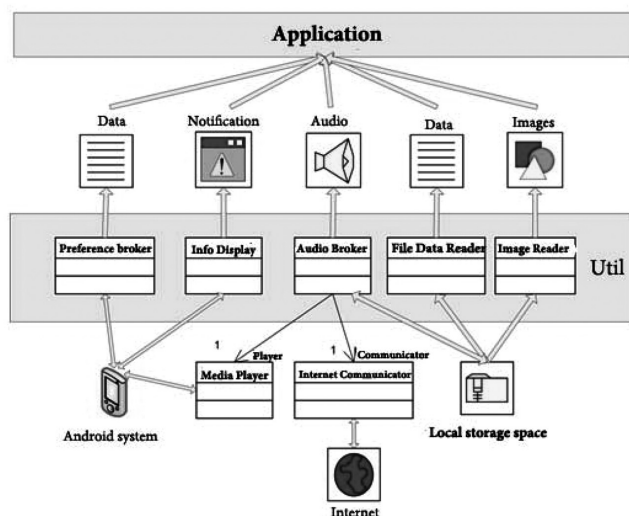


Figure 3. Presentation of the component for communication with the Android system

The role of the third component is to communicate with the web application and to access on-line resources (audio datafiles). This process is carried out in the background, independently from the current state of the application and without blocking the interaction with the user. The role of the web application is twofold:

- Evidencing available languages and provision of these to the user during installation;
- Evidencing the user data in the database and filing reports on the results achieved in learning.

3.2. Application functionality description

When starting the application for the first time, an independent Japanese word base is installed, and the user is offered a choice of languages in which the appropriate or corresponding word base/translation will be. The list of available languages and the language files are downloaded from the Internet (accessing the web application) and can be changed or amended independently from the application itself. In the present version of the application the available languages are English and Serbian, that is, this application can be used for both English/Japanese and Serbian/Japanese learning.

The main screen of the application offers the user 4 cards with respective units (Figure 4):

- Learn;
- Word lists;
- Writing;
- Profile.

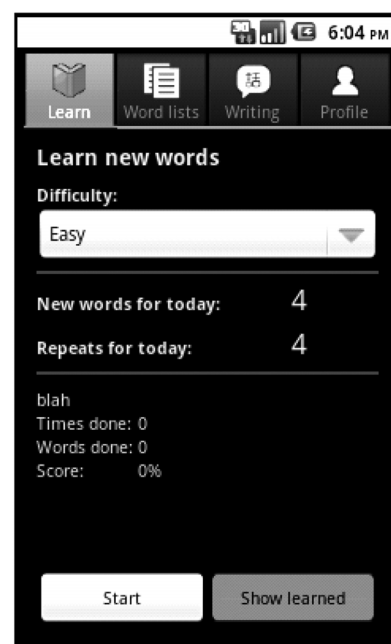


Figure 4. Presentation of the "Learn" card

The first unit, "Learn", ensures that the learning session can be started. The user can see how many new words he is expected to learn within the active session. The number of words is determined by the algorithm that takes into account the user's choice of difficulty (easy/medium/hard), the user's previous achievement, the time elapsed from the last learning session and the previous learning session status. If the user wants it, he/she can review all the previously learned words.

On starting a new learning session, the user is shown new words for this session. The presentation of new words consists of the word written in the Latin script, in the kana and kanji scripts and its translations (there may be more than one translation). If the Internet use is allowed in the application adjustment and on condition there is the Internet connection available, the application downloads the respective clip in which the given word is pronounced. If the audio clip for a word has been downloaded recently, it will remain saved in the private space of the application and used without being downloaded again. The entire process is performed in the background and does not prevent the user from browsing through the words. With a click on the "Done" key the user passes to a new activity in the learning process. A new quiz is presented (Figure 5) that contains all the newly-learned words and a number of not-so-well learned words where the user failed to achieve favourable results. The quiz consists of words-questions and a number of words-answers. Records are kept for every word separately as to how many times it was presented to the user and which is the percentage of correctness, which the user can see in the course of the quiz. The difficulty level the user has chosen at the beginning will have an impact upon the

number of offered answers as well as upon the variance of the question/task which can be written either in Japanese (in various scripts) or in a respective language. On condition the user's answer during the learning session is not correct, the application presents a dialogue with a correct answer. At the end of the quizz, the total statistics is presented for the quizz, including the number of correct/incorrect answers and the average result achieved at all the prior attempts at the quizz.

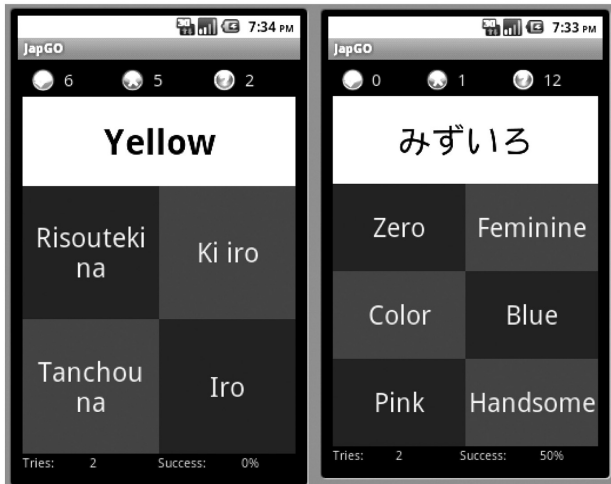


Figure 5. Presentation of "Quiz" activity

The next unit, "Word lists" is presented in Figure 6. The test in the knowledge of Japanese words is conducted via the same quizz, only with detailed adjustments of the quizz itself and the words that are grouped into certain categories (colours, numerals, animals...). The user can start a "quick session" by clicking on the "play" key with previous adjustments, or to make changes by clicking on the "more detail" key. A more detailed adjustment allows for the user to decide upon the number of choices for each question (4/6/8), the choice of the question variance and the choice of the number of words/questions he is to be asked. Also presented are the user statistics achieved on the list he/she has chosen.



Figure 6. Presentation of "Word list" card

Due attention in the application is paid to the Japanese scripts, hiragana, katakana and kanji. Hiragana and Katakana are absolutely equivalent to each other and are often taken under the common name "kana", and they are categorised as such in the application.

Figure 7 presents the "Learn Kana" unit where there is a possibility to browse through all the Kana idiograms (46 basic for hiragana and katakana, around 200 with combinations, and the so-called "ticks"). The idiograms spread over several pages that can be changed and they are arranged in a tabular order. For the purpose of better visibility, the idiograms learned are highlighted. At a click at any of the idiograms a screen appears with its detailed presentation which includes: idiogram, pronunciation, the order in which lines are drawn, example from the word base.



Figure 7. Presentation of the Japanese script learning unit

Similarly to the kana idiograms unit, the unit of a number of kanji idiograms is supported. A detailed presentation of kanji is somewhat different from that for the kana idiograms, due to their nature. Presented are the following: the idiogram, the order in which the line is drawn, the meaning of te on (originally Chinese) and kun (domestic Japanese) pronunciations written in both Latin and hiragana script.

The following two options are used to test the achievement in learning kana and kanji idiograms and allow for the quizz to start in which the tasks/questions will be idiograms instead of Japanese words. Depending on whether these are kana or kanji idiograms, the user is free to choose different adjustments related to

the set of idiograms from which he/she will retrieve questions and the question variance he/she will get.

Due to the specific nature of the Japanese scripts and a large number of idiograms presenting them (around 200 kana idiograms and 2000+ kanji idiograms), one needs a lot of practice in writing them to be able to learn them. Here the application makes use of the “touch-screen” option of the Android phones and has a section for noting the ideograms on the screen (Figure 8). In this application, the “touch-screen” functionality is entirely adjusted to the process of learning the Japanese idiograms in that a gradual fading of the drawn lines is made possible, at a speed the user can control by a slider. Thus the user is in a position to draw the idiograms (or one idiogram) much faster, successively, not stopping to wipe the screen clean. As the user is only beginning to learn how to note an idiogram, he/she may introduce semi-transparent guidelines that will present a desired Japanese idiogram. These idiograms can then be browsed through by controls that appear when the guidelines are started. Besides, a detailed instruction is provided for each idiogram as to the manner in which it is gradually drawn, as well as an example of this idiogram used in words.

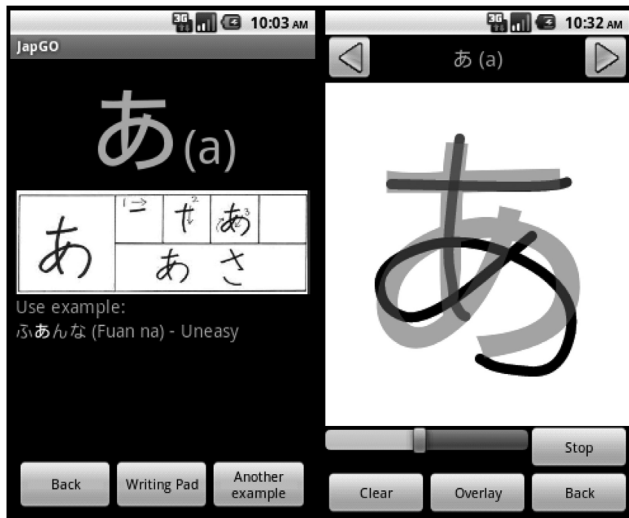


Figure 8. Presentation of the idiogram notation learning window

The part in which statistics are shown (Figure 9) allows the user to see the results achieved in learning new words, on word lists and on the Japanese idiograms quizzes. In order that students be more motivated to learn, registered users are offered an option to see the results of other users.

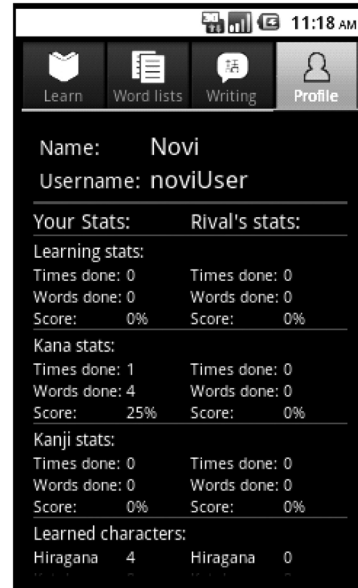


Figure 9. Presentation of the window for a comparative survey of the user's and the chosen rival's statistics

The access options are also available by adjusting the application as well as help in using (Figure 10). The use of the Internet and the presentation of the “help pop-ups” may not be allowed in adjustments, while the “help” part offers a review of all the information that may be useful in implementing the application.

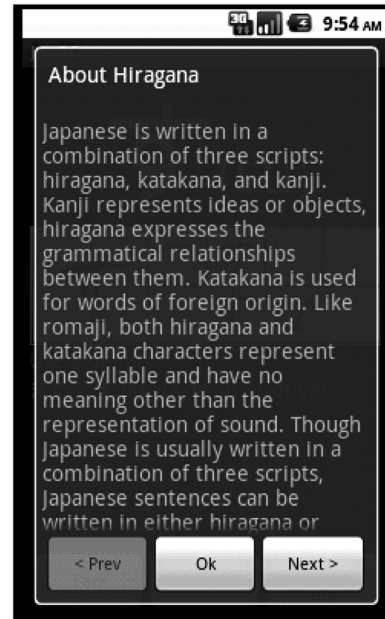


Figure 10: Presentation of the Hiragana script explanation window

4. Conclusion

The implementation of mobile technologies in language learning has become a highly interesting field of research in the last several years [1][2]. A majority of

available solutions offer an opportunity to the users to learn general information on the language and master a limited fund of words. The FONJAPGO application presented in this paper makes a full use of all the advantages of the Android platform, as well as hardware capacities of smart phones. The application architecture is described, as well as the key components of communication between the sections of the applications. The FONJAPGO application for the Japanese language learning has a large word base that is presented to the user following the application logic, incorporates all the Japanese kani scripts and a quiz to review the words learned. The “touch-screen” technology is applied in practicing idiogram notation, enriched by additional functionalities such as a gradual fading of the previously drawn lines to facilitate the repetition of the activity as well as drawing of the guide lines. Since all language data files are downloaded from the Internet and since it uses the Android internationalization system, FONJAPGO can function at any language with no need for separate versions (e.g., Serbian-Japanese, English-Japanese).

The future research are oriented towards improving the functionality of the application, integration of the FONJAPGO application into the existing electronic course system. The integration is meant to include the implementation of the FONJAPGO application in the realization of the courses and in testing the students’ achievement. Further research will also involve the evaluation of the application and data gathering on the students’ interaction with the application.

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