Location-based Vocabulary Learning App

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Abstract. This paper presents a mobile app that generates vocabulary learning games based on the user's geographical location—cinema, restaurant, museum, etc. The app sends the user a notification and offers three fun vocabulary games—*Unscramble*, *Hangman* and *Matching*—when the user enters the premises of the location of interest. This project used cinema halls as the primary location. The games are automatically generated from the movie words and phrases extracted from New York Times movie reviews. The user can either learn new words or review words learned previously. A preliminary study with seven language learners has shown learners' positive attitude towards the underling principles of location-based vocabulary learning. It has also provided constructive feedback for the future development.

Keywords*: vocabulary games, contextual learning, mobile vocabulary learning, location-based learning.*

1 Instruction

The use of mobile devices in language education, particularly in vocabulary learning, has attracted considerable attention due to the growing popularity of mobile devices among young learners (Diaz-Vera, 2012; Kim, et al., 2013; Stockwell, 2016). The advantages of mobile learning include allowing learners to self-study at anytime and anywhere, and providing contextual learning material based on where learners are and what they are doing, which is proven to be effective in vocabulary acquisition in terms of retention and comprehension (Kramsch, 1993; Webb, 2008; Edge et al., 2011). Mobile learning also has great potential in offering personalised learning experience because of mobile devices' ability of tracking and storing learning progresses.

This paper presents the exploration of the use of mobile devices to provide location-based vocabulary games that are fun and engaging. We have built a proof of concept prototype that tracks the user's movement and automatically detects the user's geographical location, in this case cinema halls, based on mobile devices' GPS coordinates and the location's textual description retrieved from Google Place Service. The app suggests vocabulary games that target the words and phrases relevant to the current context (for example, watching a movie in a cinema hall). New York Times movie reviews were downloaded and parsed by a part-of-speech tagger to create a movie words bank that contains frequently used words and phrases in movie reviews. The app is shipped with three games—*Unscramble*, *Hangman* and *Matching*—for users to learn either new words (retrieved from the movie words bank) or words learned previously. To facilitate spaced repetition, which is a common and effective vocabulary learning strategy (Godwin-Jones, 2011; Nation, 2001), the words previously learned are stored on the device and recycled periodically. The app was evaluated with seven university students, who are also language learners, at Waikato University, New Zealand. The results have indicated the students' positive perception of the principles that underpin the system.

2 Location-based Vocabulary Learning App

The app comprises three components: a movie words bank, a location detection and notification facility, and three vocabulary games.

Location-based words bank

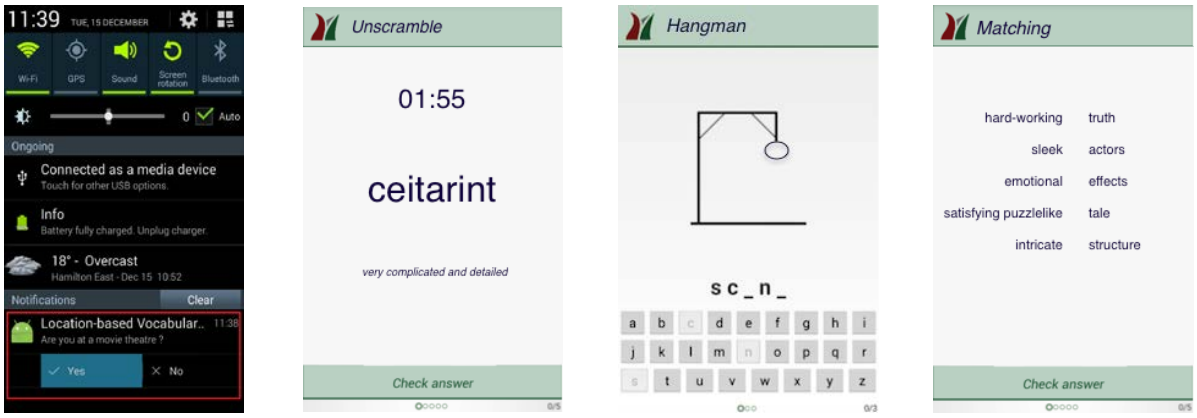
In this project a movie words bank was built from New York Time movie reviews[1] and embeded in the app. Summaries of reviews were downloaded and parsed by a part-of-speech tagger to extract individual nouns, adjectives, adverbs, and verbs, and phrases following the syntactic patterns like *adjective + noun*, *adverb + adjective*, and *noun + noun*. For example, in the review of the movie *The Prestige*

> "***Entertaining***, ***spirited*** *and* ***shamelessly gimmicky***, *Christopher Nolan's* ***new film tells*** *the* ***intricate tale*** *of two* ***rival magicians practicing*** *their* ***art*** *in late-Victorian London*"

the words in bold, along with the phrases *shamelessly gimmicky, intricate tale, rival magicians* were extracted, grouped and sorted by frequency. Two English language teachers reviewed the words and discarded those that were common and not specific to movies (e.g. *new, tell*). The final words bank contains about 400 movie words and associated phrases. To help students learn more about a word, its synonyms and definitions were also retrieved from an online dictionary, reviewed and included in the bank.

Location detection and notification

The app tracks the user's movements (e.g., the speed and moving patterns) and uses the GPS coordinates to detect the user's current location. The Google Places service is consulted for the name and description of the surrounding places. A notification, indicated by a sound, shown in Figure 1a, is triggered once the user enters the premises of a location of interest (e.g., a cinema hall). The user accepts the notification by clicking the "Yes" button, or dismisses it by clicking "No". The app launches a screen asking the user to select one of vocabulary game described in the next session if "Yes" is clicked.



(a) Notification **(b) The Unscramble game** **(c) The Hangman game** **(d) The Matching game**

Figure 1 **The notification interface and three location-based vocabulary games**

Vocabulary games

The app offers three vocabulary games: *Unscramble*, *Hangman*, and *Matching*. *Unscramble* and *Hangman* improve students' spelling skills, while *Matching* raises awareness of common word combinations. ***Unscramble*** is a permutation activity where letters of a word are scrambled. In the game, shown in Figure 1b, the player needs to reassemble the word before the countdown timer expires (three minutes by default, adjustable, and can be turned off). A hint, which is either a synonym or definition retrieved from the movie words bank, is given beneath, in this case "very complicated or detailed". ***Hangman*** asks the player to guess an unknown word one letter at a time, shown in Figure 1c. A mystery word, in this case the word *scene*, is chosen for the player to guess, and is shown by a row of dashes representing the number of letters in it. When the player suggests a letter that occurs in the word, it is put in all its correct positions. If they suggest one that does not occur, one element of the stick figure is drawn. The game is over when the player completes the word, or when the diagram is finished—in which case the player has lost. ***Matching*** is another permutation activity where five phrases are split into left- and right-hand parts, each part containing one or two words (phrases can be three words long, e.g., *satisfyingly puzzlelike structure*), shuffled and presented on each side, as shown in Figure 1d. The player matches the left-hand words with their right-hand partners by dragging and dropping them in a way that creates the strongest partnership.

[1] http://www.nytimes.com/reviews/movies

When selecting a game, the user chooses either to review the words learned previously or to learn new words. In the first the game pulls out the words from a database where the words previously learned are stored. The database also records when and how many times a word has been encountered for spaced repetition. The learned words currently are recycled three times in an interval of the next day, a week later and three weeks later, suggested by Nation (2001). In learning new words, the game retrieves words from the words bank described above, and uses those that have not been seen by the leaner. Once the learner finishes the game, the new words are saved to the learned words database for recycling later.

3 Evaluation

A preliminary user study was conducted with seven language learners with the aim to measure the accuracy of the location detection algorithm, and gather feedback on the features of notification, spaced repetition, and vocabulary games that target words relevant to the user's current context (e.g., cinema halls). Here we briefly report the findings. Seven undergraduates studying at University of Waikato, aged from 19 to 33, from three countries (i.e. China, Indian and Fiji), participated the evaluation over a week. They visited four cinema halls in the city in two days and tested the app around the premises of the cinema halls, including waiting for notifications and playing with vocabulary games. After that they were encouraged to continue to use the app over the following week. They were then interviewed and answered a set of questions.

Overall the participants were satisfied with the location detection notification facility that, they thought, was generally accurate and not disturbing, but some complaint about a few instances of unexpected delays (i.e. they had waited for too long to receive the notification). They liked the idea of learning movies-related words in a cinema hall where they may encounter those words on the poster or reviews, or they could use those words to talk about the movie with their friends. They appreciated the spaced repetition feature that would help them retain the word they have learned previously, and preferred more frequent repetition (e.g., the next day, two or three days later, weekly and monthly) to promote retention. The participants found the vocabulary games were interesting and enjoyable, and would like to play them while waiting for the movie to start at cinema halls. Feedback and suggestions were collected during the course of evaluation. Adding a scoring system and multiplayer mode would make the games more fun, and help maintain high motivation. More information about a word needs to be included, such as translation, pronunciation, and usages in sentences. Adding other locations such as museums, cafes, and sport venues were also suggested.

4 Conclusion

This paper describes a location-based vocabulary learning app that detects the user's geographical location and provides contextual vocabulary games that are automatically created using the contextual words and phrases. In this project we have built a proof of concept prototype that uses cinema halls as the target location, and focuses on the movie words extracted from the movie reviews. The initial evaluation with language learners suggested their acceptance of the design principles underpinning the system. The development of a fully-fledged application is still in progress. The accuracy of the location detection algorithm will be further improved by using more sophisticated location detection algorithms. The words banks for other locations—restaurants, museums, airports, sport venues—will be established and enriched by incorporating other language resources such as sample sentences, audio pronunciations, and collocations. Literature reviews on spaced repetition will be further carried out to develop a new recycling algorithm. More vocabulary games will be developed, with multiple players and scoring features.

5 Reference

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