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Location Based Context-Aware Support for Second Language Learning Using Ubiquitous Learning Lots

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Abstract: It is always difficult to solve the problem that how to help international students finding out suitable learning contents and learners when they want to study in a new environment. This paper considers using social network method with learners' location information to accelerate second language (L2) cold-start acquisition in context and judge the relationship among learners to find more suitable learning contents and learners. This approach is based on the Ubiquitous learning log system called SCROLL. In proposal approach, first of all, when learners go to a new environment and do not know what they should learn there, they check in the location information. Secondly, proposal approach will recommend learning logs for them using social network analysis method based on learners' learning behavior and language background.

Keywords: context learning, location based, ubiquitous learning

1. Introduction

When international students begin living in new countries or environments, it is essential for them to use their language skills in context. Additionally, mobile devices can influence how information is gathered and used in education (Johnson, L et al 2010). SCROLL, is developed to let learners to use mobile devices to learn second language in context. When learners study, SCROLL will record not only the learning contents, but also the learning environment data, like GPS information, temperature, speed, photos, audios, and even battery information.

But if learner has no learning log or not enough in the environment, SCROLL will not recommend any learning log for him, and even they do not know whether the learning contents and learners are suitable for them.

This paper aims to accelerate international students' L2 acquisition and application in context using social network analysis with learners' environment information, and judge the relationship between learners using social network analysis. In proposal approach, when learners go to a new environment and check in the location information with the name of the location, proposal approach will generate a relationship network with the point of location to find related learners, words, locations. At then, judge whether the learning contents are suitable for learners.

2. Previous Work and Issues

2.1 SCROLL

SCROLL allows the learners to log their learning experiences with photos, audios, videos, location, QR-code, RFID tag, and sensor data, and to share and to reuse ULLOs with others everywhere and anytime (Hiroaki Ogata† et al. 2010). By this, language learner can record their learning experience whenever and whatever as the Ubiquitous Learning Log Object of SCROLL.

The LLO notification processes to help recalling learning contents. When learn add a learning log to SCROLL, SCROLL will record the environment data. If the learners enter the same environment again, SCROLL will reminder learner that what they have learned there. Like this, SCROLL can help learners learning from their experiences.

2.2 Problems in SCROLL and Proposal solution

There are some deficiencies in recommendation function of SCROLL.

- The recommendation function in SCROLL is based on what learner has learned and where the learner has learned. If the learner hasn't learned any learning content in a place, SCROLL will not recommend any learning content for the learner.
- When learners study with SCROLL, they do not know whether the learning contents or learners are suitable for them.

The other hands, there are two parts in proposal method.

- Firstly, building social network that is linked by learners' location information to find learning contents and learners shown like.
- Secondly, Judging whether learning contents and learners are suitable for learners.

With proposal function, the learning style in SCROLL will be changed from passive learning to personal active learning. Because, when learners want to study, they can use check-in function to get some learning contents to learn and some learners to follow, even more function will recommend more suitable learning contents for learners.

3. Related Works

In 1973, Grnovetter and Mark had proved that social learning network analysis is the key point to support learning. In this decade, lots of researchers have developed a lot of learning system to improve learning problem with social network analysis. (Granovetter, Mark., 1973)

Social network analysis investigates ties, relations, roles and network formations, and a social learning network analysis is concerned with how these are developed and maintained to support learning (Granovetter, Mark., 1973). Therefore, a lot of researchers began to focus on using social network analysis to find the relationship between learning contents, learners, learning environment and so on.

Additionally, Martınez, A. has developed a system called Computer Supported Collaborative Learning (CSCL) system for the study of classroom social interactions (Martınez, A., et al. 2003).

In this paper, location information is used as the point of the learning network with social network analysis method to find relations between learners and learning log contents. What's more, proposal approach uses learning behavior, learning experience and Japanese background in SCROLL to understand learners' learning favorite frequency and finds similar learners for the new learners.

4. Method

4.1 General

In proposal function, when learner want to study at a place, he checks in his location information, proposal function will generate a social network for him to find learning contents and learners. After finding out some learning contents and learners, proposal function will filter out more suitable learning contents for learner with C4.5 decision tree. The flow chart is shown as Figure 5.

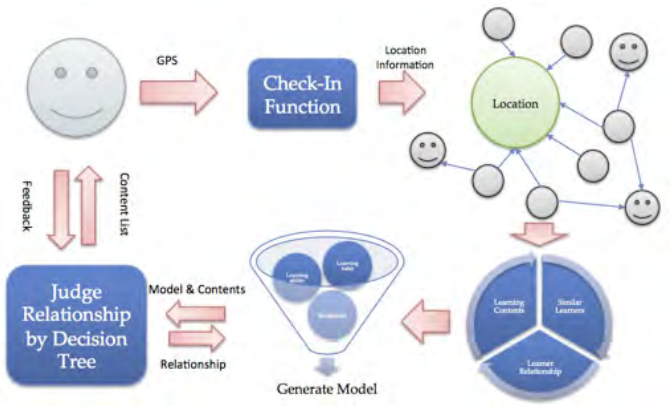

Figure 5. Flow chart of proposal function

4.2 Check-In Function

First part of proposal function is generating social network using location information.

- When learner goes to a place and want to study, he click the button on the interface to check-in his location information.
- Proposal function will get his GPS data and find place names in database and Google Place API.
- After learner selects his place name, proposal function will find out related learning contents there and related learners.

With check-in function, proposal will know where learners exactly at. It is more beneficial than get place name automatically for proposal function to find related contents.

4.3 Relationship Judgment

Nick C. Ellis has said, "Humans are sensitive to the frequencies of events in their experience. Ask them to make explicit judgments from memory about the relative frequency with which things happen and they are typically pretty good at it." (Nick C. Ellis. 2002) and proved frequency is a key determinant of L2 language acquisition. (Nick C. Ellis. 2002) Therefore, this paper chooses learning frequency as starting point to find similar L2 learners for learners.

There are four kind of learning behavior data in database. They are learning contents, location, quiz, and time. With these data, each weekly learning frequency can be calculated out.

id	nickname	wordcount	locationcount	quizcount
1	shin-chan	33.5	15.5	103.5
2	jslee	14.111111	4.111111	25.444445
3	juice	23.833334	4.3333335	210.5
4	coco	74	13	475.33334
5	Mr.Miss	5.428571	1.3571428	15.357142

Figure 6. Data process of learning frequency

After get learning frequency data, this paper used WEKA to do the model clustering. At last, all learners had been divided into 8 kinds of models. The result is shown as Figure 7.

Additionally, proposal function considered using language background to support prediction with C4.5 decision tree. To SCROLL database, accuracy of C4.5 algorithm is better than Bayesian Network and Multilayer Perceptron (Hiroaki Ogata† et al. 2014).

- Firstly, combining learners' model NO and language background in SCROLL.
- Secondly, predict out meaningful attributes to find similar learners using C4.5 decision tree classification algorithm.
- Thirdly, find out learning contents of similar learners and learning contents.

Like this, this paper can get suitable learning contents and learners. Then, learning contents and learners in check-in function can be filtered. After filtering, suitable contents and learners will be put at the front of recommend list. Result is shown like figure 8.

4.4 Relationship Management

This paper considers the relationship between each learner not only with model but also the operation in SCROLL. It means when learner selects item in recommend list, the relationship between learners will be updated in database. The next learner uses proposal function, recommend list will be sorted by relationship parameter.

5. Conclusion and Future Work

This paper considers solving this problem, which is how to help international students finding out suitable learning contents and learners when they want to study in a new environment. Firstly, this paper used social network method to generate social network that is linked by location information to find learning contents and learners. Secondly, judging the relationship between learners with C4.5 decision tree by learning frequency to find more suitable learning contents.

In the future, this paper will consider doing the evaluation experiment with international students. In experiment, two questions will be evaluated.

- Does this proposal function is helpful for students' L2 learning in context?
- Is the number of logs added by proposal function more than current function?

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