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# Movie Based Context-Aware Language Learning: Its Concept and System

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***Abstract*—Contextual teaching and learning (CTL) is a promising way for language education, since it can improve performance to learn usage of words and expressions in real conversation or situations. However, implementation of CTL is challenging for teachers since they have to deal with complicated tasks in managing interaction with learners depending on the context, especially in case CTL is provided for the big class. In this paper, the authors propose movie based context-aware language learning that enables contextual self-learning on the movie. Two key concepts, object-oriented context modeling and context-aware quiz generation, are also given. The object-oriented context model is defined to describe the context of the movie scene. The context-aware quiz generator of the system produces quizzes based on the description of the context by the object-oriented context model. Preliminary evaluation was conducted to check if the object-oriented context model can describe the context of the movie scenes. It is confirmed that the object-oriented context model has enough descriptive power for the movie scenes although it should be improved for less confusion in modeling.**

***Keywords*—CTL, movie based context-aware learning, movie description, object-oriented context model, context-aware quiz generation.***

## I. Introduction

Contextual teaching and learning (or CTL for short) facilitates students to learn something along the context. Predmore states that students learn better when they are taught knowledge along the context of actual experience, rather than in an abstracted manner [1]. One of the promising applications of CTL will be language education. CTL can improve performance to learn usage of words and language expressions in real conversations or situations. In fact, it is not effective for language learning just to remember the meaning of words with flashcards, since a word can be used for different meanings depending on the situation as well as different words means a similar thing but with different nuances. However, it is difficult for teachers to provide enough amount of CTL education for big classes. ICT based solutions known as context-aware learning can resolve the problem on CTL by enabling contextual self learning. To date, some researchers have developed context-aware learning systems utilizzing mobile and ubiquitous technologies to acquire learning context in order to facilitate learning from real environment or through real experiences [2]–[5]. Referring the widely-known definition of the context in context-aware community [6], the context in learning systems can be interpreted as any information characterizing the situation of learners, place or object involving learning activities on the system. Verbert *et al.* presented a context framework for context-aware application in technology enhance learning (TEL), which includes computing, location, activity, physical conditions, time, resource, user and social relation [7]. The context of each context-aware learning system can be derived and refined from Verbert's framework in different manners depending on its purpose. For example, the context-aware learning systems in [2], [3] consider the context relating to location and activity, while the systems in [4], [5] consider the context relating to user and location.

Learning from real situations is more dynamic and attracts learners, since it enables learners to perform learning effectively through real activities in real environment [8]. However, interaction with real environment is too dynamic and complicated to be specified. This complexity leads more development cost or limited functionality. Moreover, teachers must prepare instructional contents with context awareness. Its preparation can be much more time-consuming than preparation of ordinary education. Some context-aware learning systems require teachers to configure, deploy, and maintain external devices such as RFID tags, markers, sensors, audio and visual devices, *etc.* in the operational environment. Painful preparation disinclines teachers who use the system.

These drawbacks motivate the authors to develop a movie based context-aware language learning system. In movie based context-aware learning, learners learn from imaginary environment or through imaginary experience in the movie; that is, education is given with context-awareness in the imaginary context situated in the movie. The movie contains extremely

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rich contexts which can be utilized for language learning as same as real environment, as it is known that the movie can facilitate comprehension activities that are perceived as real as well as show natural expressions and flow of speech to learners [9]. Moreover, events in the movie are foreseeable and contexts of the scenes in the movie are described in advance. We do not need any special device to acquire the context and any effort to know unexpected circumstances in design of the context-aware learning system. These contribute to limit cost and effort to develop and operate the system. A necessary preparation to use the movie based context-aware learning system is to annotate (describe) the scenes in the movie with their contexts.

Two concepts for movie based context-aware learning are presented in this paper: object-oriented context modeling and quiz generation based on the context model.

**Object-Oriented Context Modeling:** In movie based context-aware learning, the context of the movie scene must be described in a unified and formal manner. The authors adopts object-oriented modeling for formalism and defines an object-oriented context model for uniformity. The movie is annotated by contexts describing the scenes in the movie under this object-oriented context model.

**Context-Aware Quiz Generation:** Language is learned through both self and interactive trainings. Response of the learner to quizzes is the only measure to check if he/she listened words and expressions used in the movie, understood the meaning of the conversations and situations in the movie, and has correct knowledge on the language. Therefore, the learning system generates quizzes based on the context of the replaying scene, which is described in the above-mentioned object-oriented context model, trains and examines learners by the quizzes in an interactive manner.

## II. Context Model

It is possible to describe a scene in the movie in different ways, namely in different aspects and in different structures. The proposed movie based context-aware language learning system, which generates quizzes relating to the description of the replying movie, requires a formal structure of the movie description. This formal structure is used as a standardized viewpoint for teachers to produce appropriate movie description. The formal movie description enables context-aware quiz generation. For these purposes, the authors construct an object-oriented context model for movie description.

The movie description can be categorized into static description and dynamic description. Static description is a way to describe a movie scene, namely the scene of a time instant. On the other hand, dynamic description is a way to describe movie scenes within a time interval as a series interrelated event. Static description is used for quiz generation from the scene, while dynamic description is used for quiz generation from the story. This paper focuses a formal structure for static description, that is scene description.

Based on investigation on aspects of scene description, the authors currently define nine aspects in the object-oriented context model; those are *actor*, *object*, *place*, *activity*, *feeling*, *appearance*, *physical condition*, *time instant social relation* and along with their association.

- *Actor*: animate beings in the scene
- *Object*: inanimate beings in the scene
- *Place*: at where an actor or object exist in the scene
- *Activity*: reflects the tasks, objectives or action of the actors in the scene
- *Feeling*: actor's feeling (emotional side of an actor's character, emotional responses) such as happy, angry, sad, etc
- *Appearance*: actor's or object's appearance (the way that an actor or an object looks, an impression given by the actor)
- *Physical Condition*: describes the environmental conditions occurs in the scene
- *Time Instant*: at when an actor or an object performs an activity or has a feeling
- *Social relation*: social association, connection or affiliation among actors exist in the scene

Figure 1 shows the object-oriented context model which represents the aspects of movie description and their association. Note that this model is authors' latest result and may evolve in further research. A scene of the movie is partially or fully described by an instantiated pair of the classes and an instantiated association between them in the object-oriented model. A scene is described one or more those descriptions. Each scene description is associated with the scene it describes by the starting and ending time of the scene in the movie. For example, the scene in Figure 2 can be described as follows:

```
% <Actor> – <performs> – <an activity>
Students – performs – a sport game.
% <Actor> – <be at> – <place>
Students – are at – the field.
% <Actor> – <looks> – <appearance>
Students – looks – agile
% <Actor> – <has> – <feeling>
Students – are – excited
```

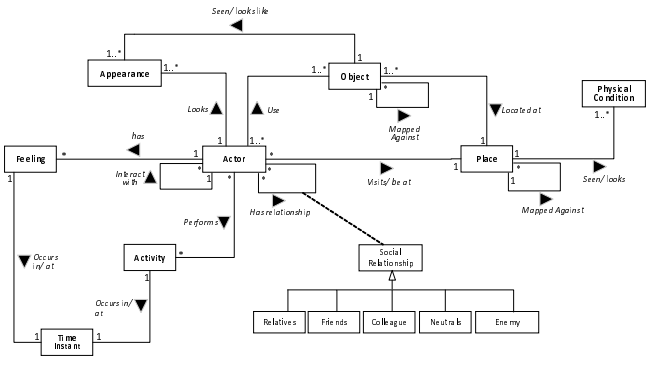


Fig. 1. Object-Oriented Context Model

The authors adopted Verbert's context model [7] as a reference. Table I shows correspondence between the aspects

Fig. 2. An Example Movie Scene

of Verbert's framework and the aspects of the presented object-oriented context model. The aspects of both context models have one-to-one correspondence, however,

- The presented model does not have *computing*, *user* and *resource* aspects in Verbert's model.
- Verbert's model does not have *actor*, *object feeling* and *appearance* aspects in the presented model.
- *location* aspect in Verbert's model is modeled as *place* aspect in the presented model.
- Both Verbert's model and the represented model have *activity*, *physical condition*, *time*, and *social relation* aspects.

Verbert's model assumes to be used in general context-aware learning systems that acquire the context automatically either from the environment by sensing devices (or other machine-readable sources) or from the information repository. On the other hand, the presented model designed for movie based language learning is used by human beings who describe the context of the movie scene. The presented model does not have computing aspect, since the device is out of concern for the context of the movie scene. The user aspect of Verbert's model, which represents information and circumstances of the learner, is not included in the presented model describing the context of the movie scenes, since the learner is out of the movie. The resource aspect of Verbert's model, which represents learning resources including learning contents, is not included in the presented model, since every aspect in the presented model is basically describing learning resources. Verbert's model is supposed not to have feeling aspect, since there is no or few popular ways to know human's feeling. The actor aspect of the presented model describes all animate beings in the scene, although the user aspect of Verbert's model describes human being (learner) only.

## III. Context-Aware Quiz Generation

The proposed movie based context-aware language learning system generates various quizzes based on the scene description when the system replays the scene. The quiz generation is template based. The authors surveyed some textbooks of Japanese language [10]–[12] and analyzed commonality and variability of quizzes to construct quiz generation templates. The result of the analysis is organized in a feature model [13] as shown in Figure 3.

TABLE I. Mapping Context

| Presented Model | Verbert's Model |
|---|---|
| Actors | NA |
| Object | NA |
| Place | Location |
| Activity | Activity |
| Feeling | NA |
| Appearance | NA |
| Physical Cond. | Physical Condition |
| Time instant | Time |
| Social relation | Social relation |
| NA | Computing |
| NA | Resource |
| NA | User |

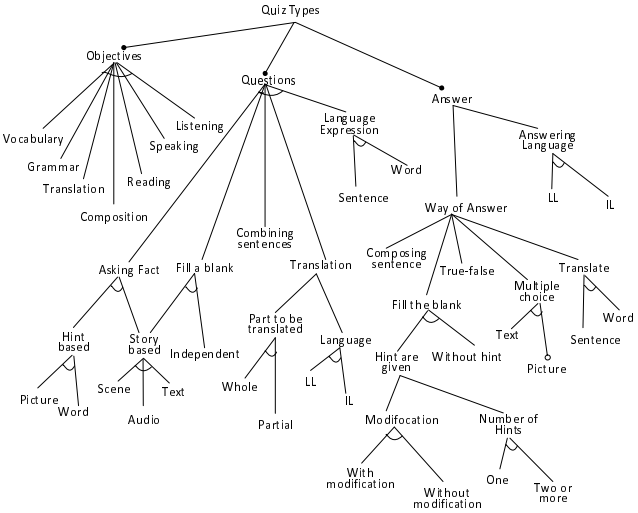


Fig. 3. Feature model of the quiz type

This feature model shows variability of the quiz objectives, question types, and ways to answer. The authors identified seven quiz objectives which represent desired skills assessed by the quiz, which includes vocabulary, grammar, translation, composition, reading, speaking, and listening skills. Question types can be classified into five general forms: asking facts, filling blanks, combining sentences, translating and language expression. Ways to answer are also specified in association with the question types. There are five general forms of ways to answer: composing sentence, filling the blanks, multiple choices, true-false and translating. In addition, answering language has alternatives: learning language (LL) or instructing language (IL). This feature model reveals possible types of quiz application to be developed.

## IV. Preliminary Evaluation

The authors conducted preliminary evaluation to validate the above-mentioned concepts. In the preliminary evaluation, the authors annotated a short movie with the object-oriented context model. The movie, whose length is 12 minutes and 50 seconds, was for publicity of a new campus of Kyushu University. ANVIL 5.1.9 [14] was employed to annotate the movie which stored the elements of annotation in XML.

The authors produced 89 statements of movie description

TABLE II. SUMMARY OF MOVIE DESCRIPTION

| Types of Context | Quantity | Example of Context |
|---|---|---|
| Actors | 17 | Student, teacher, waitress, turtle |
| Object | 32 | Tree, grass, stone, building, wind turbine |
| Place | 23 | Campus yard, classroom, restaurant |
| Activity | 30 | Studying, teaching, conducting experiment |
| Feeling | 0 | - |
| Appearance | 14 | Smoothly, beautiful, green, blue |
| Physical Cond. | 5 | Cloudy, clear, natural, green environment |
| Time instant | 1 | At night |
| Social relation | 0 | - |

through this evaluation. Table II shows the number of the objects for each class in the proposed object-oriented context model which appears in the statements. 32 *objects* were modeled in the object-oriented context model, followed by 30 *activities*, 23 *places*, 17 *actors*, 14 *appearances*, 5 *physical conditions*, and 1 *time instant*. No *social relation* and *feeling* were modeled. In total, 122 objects of the object-oriented context model were used to describe the movie scene context of 12 minutes 50 seconds. The authors tried to describe the movie based on the proposed object-oriented context model as much as possible; however, some statements could not be described in the model. These unsatisfied statements will be analyzed further to enhance the movie description framework.

It is noted from this evaluation that some confusion can be brought for recognition of the class of the object. For example, *building* can be categorized as *place* or *object* classes depending on the modeler. The same confusion can happen between *appearance* and *physical condition* classes. Furthermore, it is experienced that there is a room to define a new description structure; for example, *Actor - perform - Activity*.

Through this preliminary evaluation, it is realized that the movie description framework needs to be enhanced. Class and association definition should be formulated to reduce confusion in modeling. The authors is planning to conduct evaluation with two or more different modelers to asses how feasible this object-oriented context model is for the purpose of movie description.

## V. CONCLUSION AND FUTURE WORKS

The movie can be utilized to realize contextual teaching and learning (CTL). This paper presented the concept of movie based context-aware language learning. Two key concepts, namely object-oriented context model and context-aware quiz generation, are defined to realize CTL in movie based context-aware language learning system. The context of the movie scenes are described along the object-oriented context model. The system generates quizzes based on this context description. The type of the quizzes to be generated was summarized by the feature model. The results of the preliminary evaluation show necessity of enhancement of the object-oriented context model for richer representation of the context. Future research will focus on development of the prototype context-aware quiz generator.

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## REFERENCES

[1] S. R. Predmore, "Putting It into Context," *Connecting Education and Careers*, Vol. 80, Jan. 2005, pp. 22–25.

[2] H. Ogata, N. Uosaki, "A New Trend of Mobile and Ubiquitous Learning Research: Toward Enhancing Ubiquitous Learning Experiences," *Mobile Learning and organization*, Vol. 6, May 2012, pp. 64–78, doi:10.1504/IJMLO.2012.046883.

[3] H. Ogata, R. Akamatsu, Y. Yano, "Computer Supported Ubiquitous Learning Environment for Vocabulary Learning using RFID Tags," *Proc. IFIP TC3 Technology Enhanced Learning Workshop (TeL04)*, Springer, Aug. 2004, pp. 121–130, doi:10.1007/0-387-24047-0-10.

[4] M. Li, H. Ogata, B. Hou, S. Hashimoto, N. Uosaki, Y. Liu, Y. Yano, "Development of Adaptive Vocabulary Learning via Mobile Phone E-mail," *Proc. 6th IEEE Conf. on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE '10)*, Apr. 2010, pp. 34–41, doi:10.1109/WMUTE.2010.9.

[5] G. J. Hwang, C. C. Tsai, S. J. H. Yang, "Criteria, Strategies and Research Issues of Context-Aware Ubiqutous Learning," *Educational Technology and Society*, vol. 11, 2008, pp. 81–91.

[6] G. D. Abowd, A. K. Dey, P. J. Brown, N. Davies, M. Smith, P. Steggles, "Toward Better Understanding of Context and Context-Awareness," *Handheld and Ubiquitous Computing, Lecture Notes in Computer Science*, vol. 1707, 1999, pp. 304–307, doi: 10.1007/3-540-48157-5-29.

[7] K. Verbert, N. Manouselis, X. Ochoa, M. Wolpers, H. Drachsler, I. Bosnic, E. Duval, "Context-Aware Recommender System for Learning: A Survey and Future Challenges," *IEEE Trans. on Learning Technologies*, Vol. 5, Oct–Dec. 2012, pp. 318–335, doi: 10.1109/TLT.2012.11.

[8] J. Herrington, R. Oliver, T. C. Reeves, "Pattern of Engagement in Authentic Online Learning Environment," Education Technology, vol. 19, 2003, pp. 59–71.

[9] D. Chan, C. Herrero, *Using Film to Teach Languages: A Teachers Toolkit for Educators Wanting to Teach Language Using Film in the Classroom with a Particular Focus on Arabic, Mandarin, Italian and Urdu*," Cornerhouse, 2010.

[10] Tokyo YMCA Inst. Japanese Studies, *Express Japanese*, Hakusuisha, 1987. (in Japanese)

[11] E. Banno, Y. Ikeda, Y. Ohno, C. Shinagawa, K. Tokashiki, *An Integrated Course in Elementary Japanese*, *Genki 1 Textbook, second edition. The Japan Times*, 2011.

[12] E. Banno, Y. Ikeda, Y. Ohno, C. Shinagawa, K. Tokashiki, "An Integrated Course in Elementary Japanese", *Genki 1 Workbook, second edition. The Japan Times*, 2011.

[13] K.C. Kang, J. Lee, P. Donohoe, "Feature-Oriented Product Line Engineering," *IEEE Software*, Vol. 9, 2002, No. 4, pp. 58–65, doi:10.1109/MS.2002.1020288.

[14] M. Kipp, "Multimedia Annotation, Querying and Analysis in ANVIL" *In: M. Maybury (ed.) Multimedia Information Extraction, Chapter 19, Wiley - IEEE Computer Society Press*, 2012.

[15] J. Underwood, R. Luckin, N. Winters, "Milexicon: Harnessing Resources for Personal and Collaborative Language Inquiry," *Proc. 1st Int. Conf. on Interdisciplinary Research on Technology, Education and Communication (ITEC 10)*, Springer, May 2010, pp. 87–98, doi: 10.1007/978-3-642-20074-8-8.