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Requirement Engineering Meets Emotion: An Examination of Quiz Master

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Abstract:
Quiz is one of the most common undergraduates' assessment method used in UNIMAS. The conventional quiz setting is based on the paper based and there is a widely adopted online quiz among the lecturer in UNIMAS and game-based quiz. Building on the popularity of game-based quiz, can we introduce an interactive quiz to the students? It is possible but no straightforward. This paper presents the authors experience to model an interactive quiz. It reveals some insufficiency to use UML in modelling interactive quiz at the beginning of the project and present a proposed solution to overcome the gap. From the finding, the UML models is very much on modelling the system functionalities requirements. It is lacking people oriented element and need further improvement. As interaction quiz is much human oriented, modelling of human aspect like emotion, feeling should be highlighted when modelling the entire system. In this paper, agent oriented modelling is introduced to model an interactive application. Agent oriented modelling is used to model a complex socio-technical system. Hence, it is able to transform a conventional system towards an interactive system.

Keywords: *emotion modelling, agent oriented models.*

1. Introduction

Quizzes is a form of knowledge assessment usually given to students in an informal manner. It has been carried out by many education institutions, even at the university level. According to Roediger III, Putman, and Smith (2011), the key benefit of quiz is knowledge retention. In UNIMAS, quizzes have been conducted through paper based at early years and online quiz is receiving much attention nowadays. To date, game-based quiz is introduced to provide better interaction and motivation to students. In fact, integrating game elements in quizzes can motivate students in their study.

A conventional quiz application consists of question and answer in which the students will provide the answer based on the question given. On the other hand, an interactive quiz system is introduced in which students can interact with virtual character during question and answering. QuizMASter is an educational game that integrate with game base learning (Leung et al., 2013). It is designed based on the TV quiz show, where the game show host will present questions to a group of contestants who are competing. In QuizMASter, contestants are replaced by students, and the host is replaced by an intelligent software agent to provide appropriate feedback through studying the reaction of students. It allows students to

perform collaborative learning through friendly competition (Dutchuk et al., 2009).To what extend, we can redesign a conventional quiz application into interactive quiz?

This paper presents the authors experience to model an interactive quiz. It reveals some insufficiency to use UML in modelling interactive quiz at the beginning of the project and present a proposed solution to overcome the gap. From the finding, the UML models is very much on modelling the system functionalities requirements. It is lacking people oriented element and need further improvement. As interaction quiz is much human oriented, modelling of human aspect like emotion, feeling should be highlighted when modelling the entire system. In this paper, agent oriented modelling is introduced to model an interactive application. Agent oriented modelling is used to model a complex socio-technical system. Hence, it is able to transform a conventional system towards an interactive system.

Section two presents the findings on using UML to model a conventional quiz application and then interactive quiz application. Section three introduce the proposed methodology to model an interactive quiz application through agent oriented modelling. It presents a walkthrough example on the adoption of the agent oriented modelling to model an interactive quiz application. This section will serve as the evaluation section of the proposed approach. The paper is concluded in Section four.

2. Modelling quiz application through UML

Working on the game-based quiz, the authors adopt UML to model a conventional quiz system. Figure 1 presents the Use case diagram for a conventional quiz system. The use case diagram is used to show the interaction between the actor and the QuizMASter. The actors consist of admin, student, and game host (e.g. QuizMASter). In brief, the admin of the application can create and delete the account for students. To start the quiz, the student is required to login to the application. If the students do not have the application account, they are required to register a new account through the web system. Once login to the web system, student may start the game and answer every question presented. Student may also view the current score while attempting the quiz and the previous score for the quizzes they have tried out previously. Once the student has done the quiz, they may logout from the web system.

Throughout the quiz, the game host will be in-charge of interacting with the student. Questions will be presented by the game host. After the student answered each question, correct answer will be shown. If the student answered the question correctly, the game host will express happy emotion. If the student answered the question wrongly, the game host will express sad emotion, followed by brief explanation on the answer.

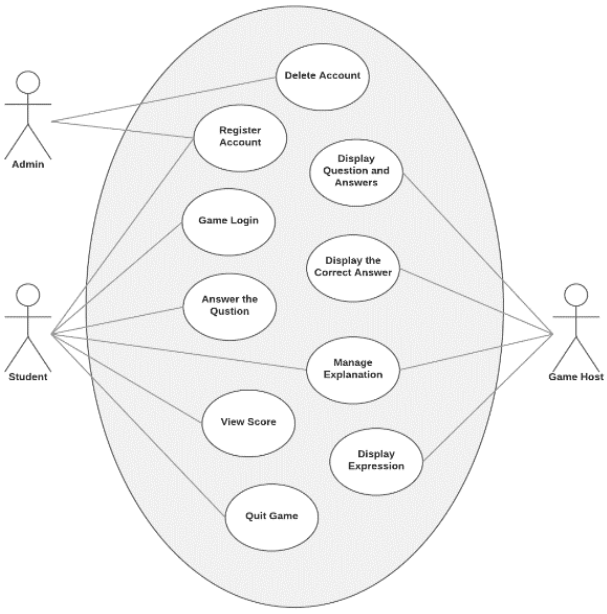

Figure 1.Use case diagram for conventional quiz system

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From the use case, the activity diagram, class diagram are presented in Figure 23. Figure 2 shows the activity diagram of proposed application. When the website is loaded, student is required to login to their account before the quiz can be started. Student is required to register an account if they do not have the account. Once the student is login successfully, the quiz can be started. Each question and its choice of answers will be presented one by one. The answer selected by the student will be checked whether the question is answered correctly or wrongly. If the question is answered correctly, the happy mood of the game host will be increased, and happy expression will be shown. If the question is answered wrongly, the sad mood of the game host will be increased, and sad expression will be shown. Then, brief explanation on the answer will be made. After that, the game host will encourage the student to perform better for the next question. Once all questions are answered, the quiz can be ended and the final score for the quiz will be show.

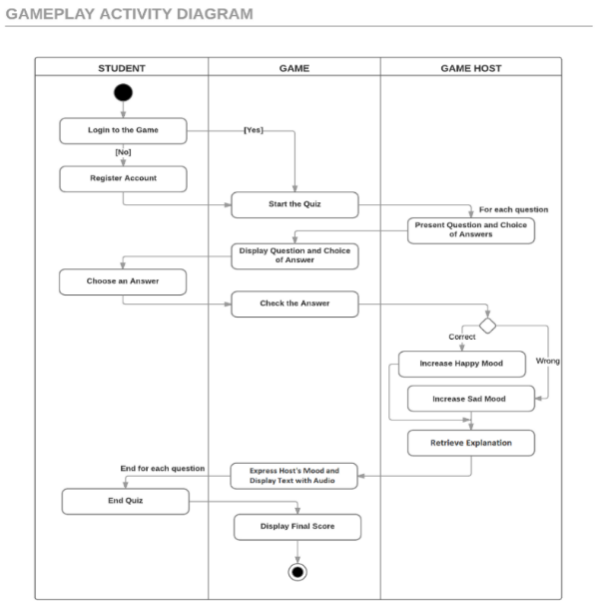

Figure 2. Activity diagram for conventional quiz system

The requirement of a conventional quiz system is presented in Figure 1, Figure 2. From the case study, if we want to have a beliefable QuizMASter, we argue that it should mimic how people or teacher react in answering the question. One way is to add emotion element in the QuizMASter. However, it seems insufficient through the current UML models. It is sensible to claim that modelling the emotion for QuizMASter should contain the following criteria.

1) Emotion design can range from face expression, tone, text, background, lighting, verbal and non-verbal movement, reasoning. Hence, modelling of emotion character should be incremental. However, how to model emotion through use case as example?

2) The unifiying emotion and system model is needed. We argue that emotion is part of the system development and hence the emotion should be concern in every phases of system development. This is inline with the argument that all the non-functionality requirement should unify with the system model[Devanbu, 2000]. The unification is needed in order to better deploy and build the right combination of customer features and emotion measures. The customer features cover the functionality of the system and emotion measures reflect the emotion handling in regards to the functionality of the system.

3) Model tranformation is needed when modelling the emotion aspect of the system. How to present the model at the higher level of abstraction, then transform into design and implementation is needed to ease the maintainence and trace of the emotion elements.

4) As emotion is an abstract element, how to communicate the emotion to various stakeholders are needed. Issue like communicate the emotion element to the requirement engineer, business owner; communciae the emotion element to the system designer and programmer are worth to explore.

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Inline with the use graphical representation of the software system, we argue that the emotion aspect need to represent in graphical diagram.

Based on the findings, it motive the authors to explore on alternative approach to model an interactive quiz application like emotion based QuizMASter. In the following section, we introduce an agent oriented modelling extension in order to model an interaction application.

3. Modelling interactive quiz application through agent oriented Modelling

As mentioned before, one of the challenge to model an interactive quiz is on how to elicitate the notion of interactive through UML diagram. As there is insufficiency to adopt UML to model the interactive application, we propose an alternative method to model the interactive quiz application through agent oriented modelling. The details of the modelling steps are following.

Table 1. Extended agent oriented modelling steps for interactive application development.

Phases	Competency questions	Model
Requirement phase	1. What are the purpose or problem of the system? 2. Which position to hire in order to solve the problem?	Goal model
	3. What do you feel when you areachieving or wanted to achieve a goal? 4. Who has this feeling? 5. Elaborate more why you have this feeling? 6. Elaborate more how to come across to this feeling? 7. How to you express the feeling explicitly?	Emotion oriented goal model Emotion oriented role model Emotion oriented Tropos goal model Emotion oriented goal model Emotion oriented domain model
System design phase	How to design those feeling into the system?	Scenario model Interaction model Behaviour model

Table 1 presents the modelling steps for interactive application. The modelling process consists of two phases. They are requirement phase and system design phase. The requirement phase involve understand the needs of the users. On the other hand, the system design phase covers the design element of the interactive application. A set of competency questions are introduced to guide the requirement and system design phases. The competency questions are derived from agent oriented requirement elicitation. From the elicitated answers, the developer can model the system through various agent models. In refer to the interactive quiz application, we present the walkthrough example as following.

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1. What are the purpose or problem of the system?

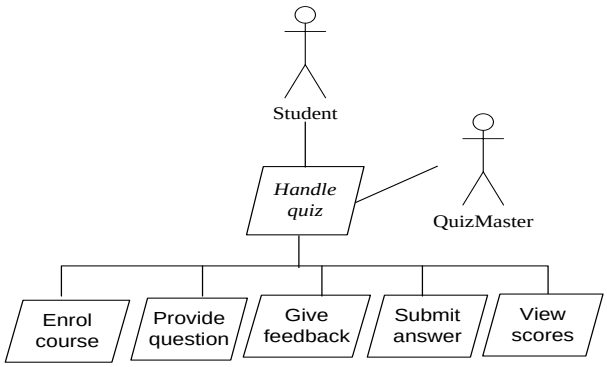

Figure 3. Overall goal model for conventional quiz application

Figure3 shows the overall goal model for a conventional quiz application. The main goal for quiz application is to 'handle quiz'. It needs to be achieved by students and quizmaster. Here, it consists of sub-goals like register, 'provide question', 'give feedback', 'submit answer' and 'view score'. In the land man term, students and quiz master are involved in the quiz application. Both of them are required to serve the goal of 'handle quiz'. In order to achieve the goal, sub-goals like register etc need to be achieved by them.

2. Which position to hire in order to solve the problem?

Figure 4.Organization model for conventional quiz system

Figure4 shows the organization model in which it models the interaction and role to be recruited to solve the quiz problem.

3. What do you feel when you are achieving or wanted to achieve a goal?

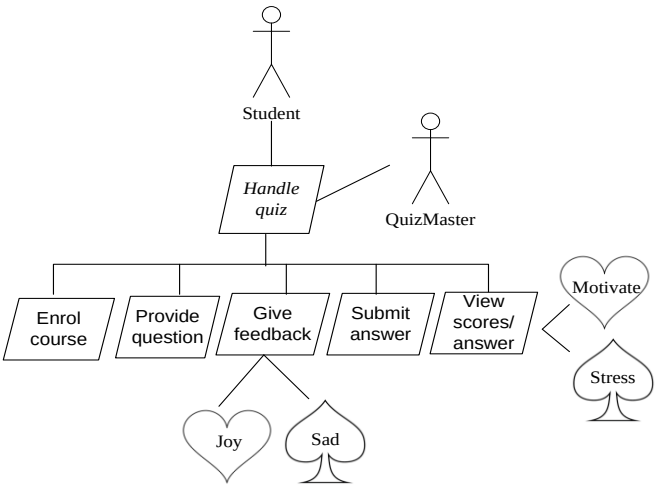

Figure 5. Emotion oriented goal model for interactitve quiz application

Figure 5shows the emotion oriented goal model for interactive quiz application. The love shape is defined as positive emotion. The spade shape is defined as negative emotion. It is up to the stakeholders to decide whether the emotion is mapped as positive emotion or negative emotion. From the model, it can interpret that student or QuizMaster feel motivate and/or stress while view the scores or answers; student or QuizMaster feel joy and/or sad after giving feedback. To be more precise, the feeling can be modelled with emotion oriented role model as shown in Figure 6 , Figure 7 and Figure 8. This provide the answer of *4. Who has this feeling?*

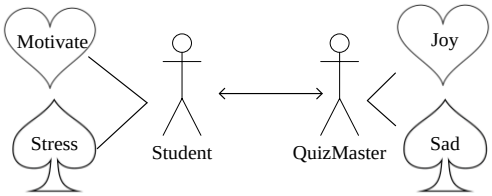

Figure 6. Emotion oriented organization model

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5. Elaborate more why you have this feeling? 6. Elaborate more how to come across to this feeling?

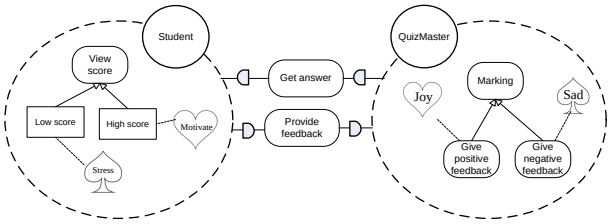

Figure 7. Emotion oriented Tropos goal model

7. How to you express the feeling explicitly?

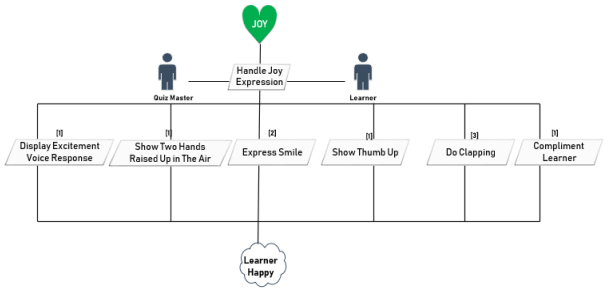

Figure8. Emotion oriented goal model

4. CONLUSION

We present the initiate work on modelling the interactive application through agent oriented modelling. Hence, an emotion artifacts are introduced in agent oriented modelling to elicitate the interactive requirement. Considering the elicitation of the emotion is missing at the early stage of the development, there is a need of new insight on unifying emotion modelling and system modelling.It is important to incorporate emotion thinking throuhgout the development process. This is important to reduce the risk of creating an unacceptable requirement in software design. Consequently, user experience can be improved early, reduce the cost to redevelop the system.

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