

How to Judge Learning on Online Learning: Minimum Learning Judgment System

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1. INTRODUCTION



Figure 1. Purpose of Research

- Over 10 million people participate in online learning courses, which has resulted in the proliferation of the use of MOOCs.
- Consequently, the number of online courses that implement online learning platforms, such as Moodle, Coursera, and edX has steadily increased in online education.
- However, due to the high number of students participating in MOOCs, one critical problem that must be addressed is how instructors can conduct learning assessments that determine learning.
- Traditional assessment methods are not suitable for online education. Most existing online learning platforms require a simple quiz and online exam based on traditional assessment methods [2].
- Many quizzes and exams can be a burden to both instructors and students. Thus, it is necessary to develop an automatic learning judgment system that can quickly and simply assess learning.
- In this paper, we aim to design and develop a minimum learning judgment system.

Our approach aims to solve learning assessment challenges in online education in order to minimize the amount of effort required by teachers and learners in assessing learning.

2. Minimum Learning Judgment System

2.1 Definition of Minimum Learning

- For definition of Minimum Learning, In this paper, we define minimum learning as a behavior state of initial learning.
- In other words, watching video content is the minimal behavior of learning apart from understanding.
- It does not mean that system can assess understanding of content knowledge.

2.2 Judgment System

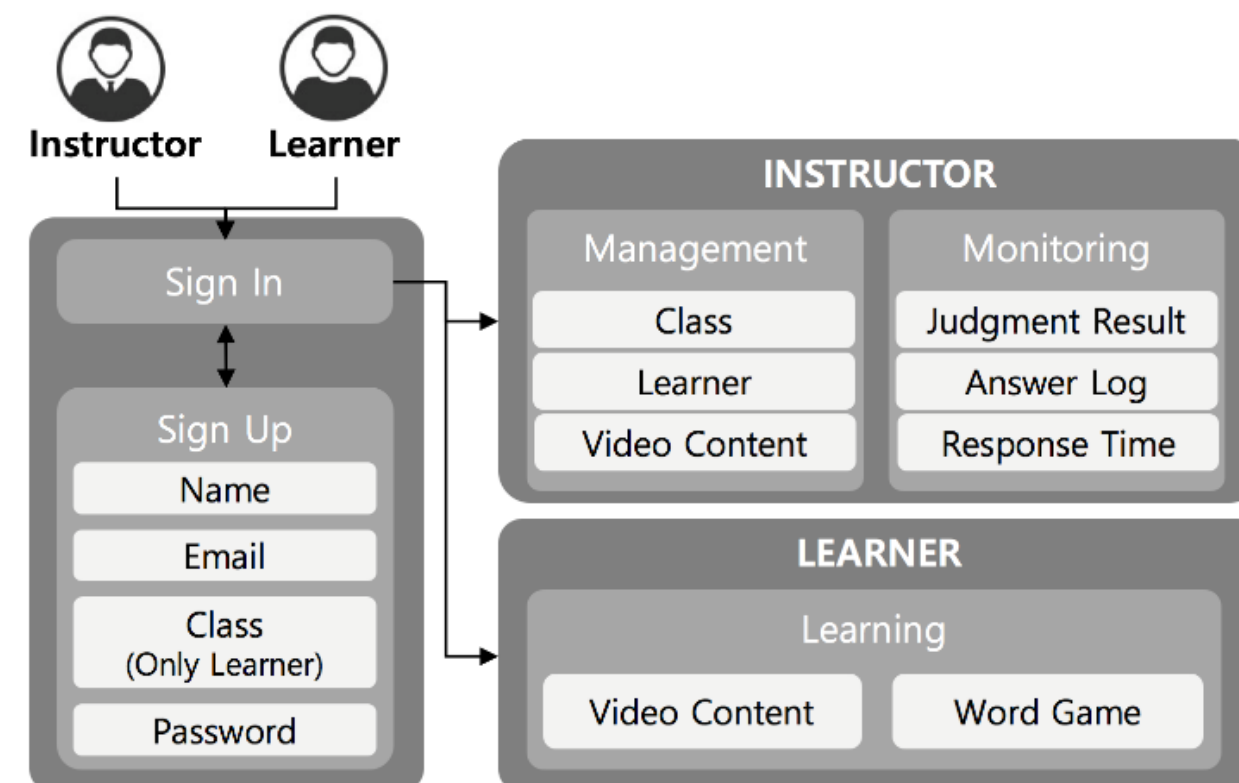


Figure 2. Overall System Process

Figure 2 presents the overall system process for users. After registering an instructor, the instructor can add classes and upload video contents. Words are extracted from the uploaded video content and word frequency is automatically calculated. After registering a learner with a class, the student can learn by viewing video content that the instructor has uploaded. After viewing the video, the student can begin the word game.

2.3 Word Game

- In the word game, the student decides whether words did or did not appear in the video.
- The system judges minimum learning by measuring the student's response time and accuracy in the word game.

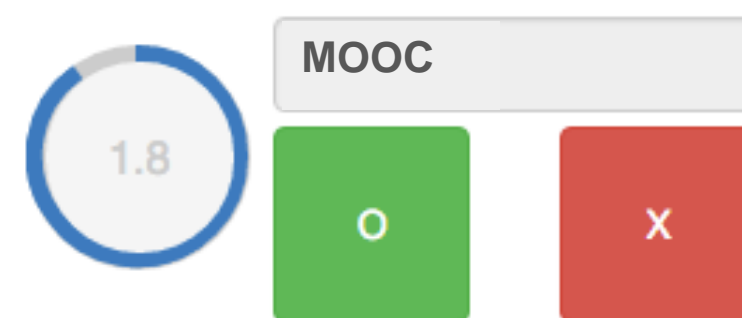


Figure 3. The Scene of Word Game

- The words that appear in the word game use word frequency from uploaded video content and the Sejong corpus (made by www.sejong.or.kr).
- In order to select words for the word game, words are selected by measuring the weight of each word, which is based on both previous videos that the student learned and on the current video content that student is watching.
- Each student plays a word game with a different word set in which different weights correspond to different learning logs. The weight of a word is calculated as follow:

$$w_{ij} = tf_{ij} \times \log \left(\frac{N}{n} \right) + 1$$

A weight $w_{ij} > 0$ is associated with each word i in a video content j . Let tf_{ij} refer to the frequency of word i in video content j . Let N refer to the number of video contents viewed by the student in the entire set of video contents. Let n be the number of video contents where w_{ij} appears in N .

3. EXPERIMENTS

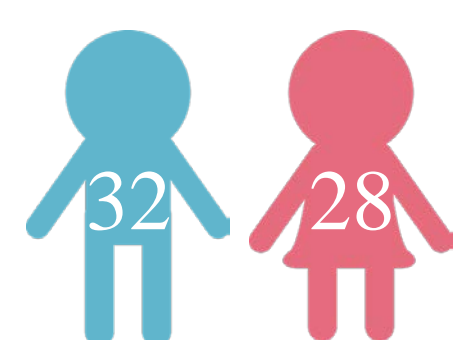


Figure 4. Participants

32 of the students were male, 28 of the students were Female, and the ages of the selected participants ranged from 19 to 27. Each participant viewed video content and then played the word game. Then, participants' attention levels were assessed on a five-point scale using the Likert-type scale. The data collected from the system was analyzed based on the EM algorithm using WEKA.

- In order to get a criteria score, we conducted an experiment in which we tested 60 undergraduate students.

Table 1. Result of Clustering

| Feature | Cluster | A | B |
|-----------|---------|--------------|--------------|
| Attention | | 1.004 | 3.6084 |
| | | (SD. 0.027) | (SD. 1.0678) |
| Score | | 6.0588 | 9.5569 |
| | | (SD. 2.0694) | (SD. 2.566) |

Table1 presents the results of our analysis. Cluster A refers to the set of participants who did not pay attention while watching the video content. On average, the members in Group A selected 6 of the 14 words correctly. Cluster B refers to the set of participants who paid attention while watching the video content. On average, the members in Group B selected 9 of the 14 words correctly. Therefore, the criteria for the minimum learning judgment system correspond to 7 correctly selected words.

- we ran a minimum learning assessment to determine whether learners watched the video content or not.
- In a test set, 240 undergraduate students participated in the experiment. Participants were divided into two groups: an experiment group, which consisted of 120 students who watched the video content, (Pass) and a control group, which consisted of 120 students who did not watch the video content (Fail).
- For this experiment, system judged minimum learning based on 7 score in word game.

Table 2. Result of Test

| | Precision | Recall | F1 |
|------|-----------|---------|------|
| Pass | 92.1875 | 98.3333 | 95.1 |
| Fail | 98.2142 | 91.6666 | 94.8 |

Table2 presents the results of the test, which measured precision and recall. For the Passing group, the result of minimum learning judgment demonstrated a precision rate of 92% and a recall rate of 98%. For the Failing group, the result of minimum learning judgment demonstrated a precision rate of 98% and a recall rate 91%.

- Finally, the performance of system shows about 95%.

4. CONCLUSION

- This paper presents how a minimum learning judgment system can solve assessment challenges in online education environment by reducing the work required by both instructors and learners.
- This system shows about 95% performance but it is optimized for the training data set.
- But, we need to conduct further experiments and analyses using machine learning algorithms and educational data mining technologies in order to develop and strengthen our system.

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