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TagAssessment: Using Tagging Technology for Learner Assessment

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Abstract

Nowadays, with development of Information technology, using e-learning for higher quality of education has been increased. On the other hand with the emergence of Web 2.0 and high interest for using its technologies such as tagging, annotating and social networking caused to more users participation than before. In this regard, one of the most popular technologies is Tagging. Usually users used to place tags on the contents as a reminder in future.

In this paper, a novel method is proposed to assess the learners' understandings. The mentioned method which is named TagAssessment computes the figure of relationship between the contents and the user's tags and utilizes the obtained results for learner assessment. In this regard, the semantic distance between the tags associated to the content, and the concepts covered by the same content is calculated using WordNet tree ontology. In the evaluation process, ninety learners were asked to place their tags on the contents related to a BSc course to create a data set for further evaluation. The obtained results showed that as the smaller the distance between the learners' tags and the contents are the better comprehension have been achieved.

Keywords:

E-Learning, Learner Assessment, Tagging, WordNet, Ontology, Web 2.0

1- Introduction

Development in the digital domains caused to betterment in all characteristics of man living. One of the most important aspects of human life is learning. Hence e-learning systems are used which a kind of distance learning. Likewise these systems are made it possible for everyone to study in each time and place.

With the increasing of using web 2.0, its technologies such as tagging and annotating are consequently applied in e-learning field too. Generally, tags are terms that could include some words and usually assign to different contents as a reminder. These tags could help users to access easier to the contents in the future. For example, when a user assigns "multiplication training" tag to a content after reading it, in the next returning there isn't needed to read the whole of the content and simply with reading such tag, content concepts are reminded.

Generally speaking, depends on the platform, tags could be added to different sources like images, texts, web pages and whole of contents. In addition, there are some differences between tags and annotations. Tags usually include at last four words but in annotations, there is no such as this limitation. Also typically in annotating, the users are freer and more apply folksy language. Because of this, tag processing is being very simpler than processing annotations; since there isn't needed to use complex natural language processing algorithms for analyzing users' annotations. However, selecting the term of tag is based on users and their personalities and maybe doesn't have any meaning for anyone else.

One of the most important concerning problems in e-learning systems is how to assess learners [2]. Without assessment the perception level of the learners couldn't be measured. Assessment is critical part of education and many researchers emphasize that there is a close association between instruction, learning, and assessment [9].

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From another perspective, assessment could be direct or implicit. Each of both methods has advantages and disadvantages. In Direct methods, designing the tests' questions are simpler but these tests also caused to increase stress on students and consequently the result of the assessment is lower than the actual value. On the other hand, implicit methods like games and puzzles don't have mental pressures but designing such good applications that assess the learners with them completely isn't easy.

In this paper a novel method which named TagAssessment is proposed to assess the learners from semantic distance of their tags and the contents. To achieve this aim, using standard tags which experts assigned to those contents. It means that if the learners understand content, their tags must be related to concepts of it. To evaluate this method, an e-learning system was designed and ninety learners was asked to use it and tagging on its contents. The result of evaluation shows that the idea of TagAssessment is fairly valid.

In the following of paper in section 2 the works that be done in this field is briefly described then in section 3 TagAssessment method is be introduced. The evaluation of proposed method is specified in section 4 and at last in section 5 the conclusion is given.

2- Related works

Recently, the academic works have been done in a domain of web 2.0 technologies on e-learning environments specially tagging are increased. In [4] a prototype of the iHelp Presentation multimedia video presenter is described. This system helps users to highlight significant parts of the recorded lectures' slides and also to add annotations and tags to recordings. Tagging represents an action of reflection, where the tagger sums up a series of words into one or more summary tags, each of which stands on its own to describe some aspect of the resource based on the tagger's experiences and beliefs [18].

However, the volume of information presented to a user in a virtual world could be a barrier. For example, when using an Internet website for e-learning system, one can effectively maintain a distance from the content, browsing at a high level. In contrast, the enriching, immersive nature of the experience in virtual worlds can hinder the learning process if there is not appropriate guidance [7]. Potentially, though, this immersion can be of benefit, if used correctly, and therefore it is important that new ideas and concepts are developed to support it [14,15].

Assessment is one of the most important processes in learning process. In [6] were four formal assessment items within the module which counted towards the overall module grade. As further suggested in [5], using simple, multiple-choice assessments is not necessarily enough alone, but should form part of a larger set of learning activities.

In [1] and [3] say that using tags and concept map for finding experts in collaborative learning environments but, according to our studies, there isn't any work has been done that used learners' tags for learner assessment.

Traditional assessment methods could be represented at the left extreme of a continuum indicating the degree of autonomy for learner's learning [11]. In contrast modern methods such as self assessment, peer assessment, and collaborative assessment can be rep-resented, aiming to change place and function of the assessor [10].

3- Methodology (TagAssessment)

In this section, a proposed method named TagAssessment will be introduced in detail. This method implicitly evaluates the learners based on semantic relevance of their tags and the contents. These tags represent the view point of the learners about contents and how much they comprehend about them. More suitable tags mean the more understanding about content. Furthermore, it could be expected that if the user's tags don't have a semantic relationship with the concepts of content that user doesn't understand completely.

The architecture of TagAssessment is illustrated in figure 1. Each user could read different contents and add amounts of tags on them. These tags describe the point of view of user about that content. To compare of these tags and contents, the contents must be tagged with experts as standard tags. In the other words, these standard tags are concepts which in experts standpoints covered by contents.

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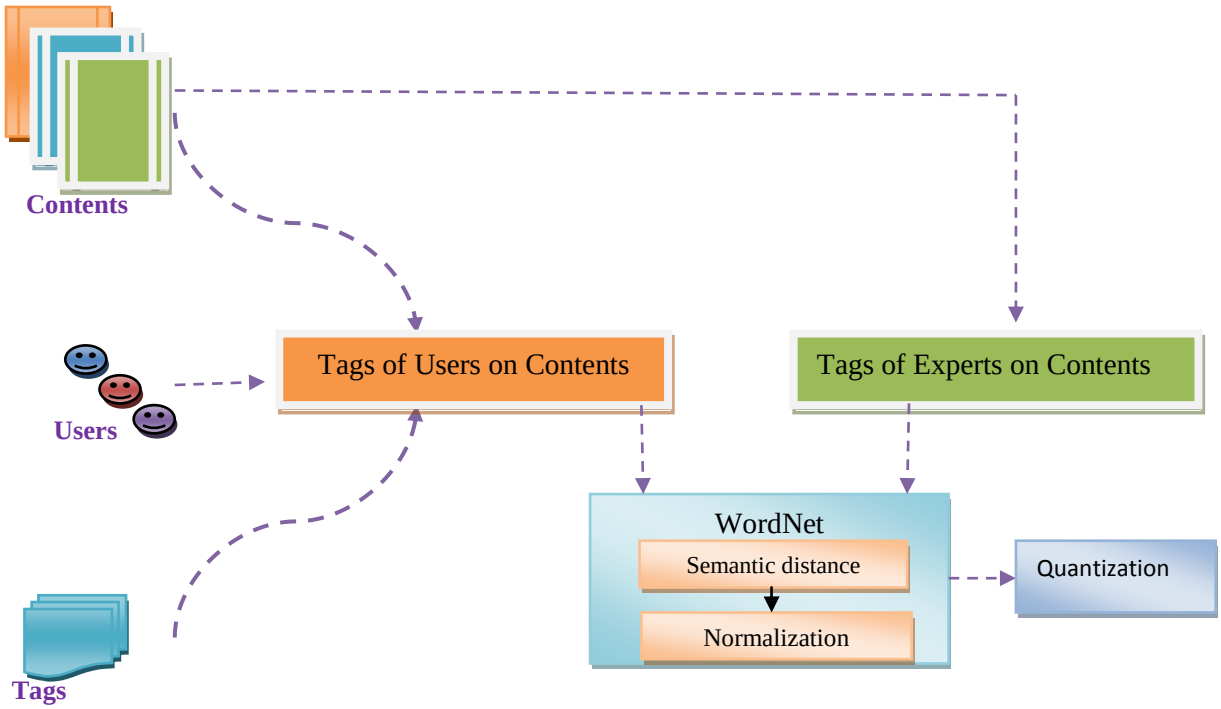

Figure1 – the architecture of TagAssessment

To calculate the relevance of standard tags and learners' tags, which called semantic distance, WordNet ontology is used. WordNet is a general dictionary that shows each word in a tree structure. In figure 2, a simple ontology is shown. There is a distance function in WordNet that computes the distance of two words in WordNet ontology. The result of this function is a value between zero and one. The greater value means more similarity in those words. Using this function the semantic distance between two words could be calculated.

Users could add more than one tag on each content and also there are some standard tags for each content. So it is possible that for a specific user and content, several semantic distances are calculated. For example, if the user put four tags on a content and there are three standard tags on such content 12 semantic distances could be calculated. For independency of the result from the number of user's tags and standard tags in each content, these distances must be normalized. In this paper, average of distances is used for normalization.

This distance could be use for evaluate of users' understanding and have direct relation with it. This distance is desecrated in four areas: A for [0 – 0.25], B for (0.25, .05], C for (0.5-0.75] and D for (0.75 – 1].

Of course using just this method to evaluate the learners not be perfect, and it is better to apply this method jointly with other evaluation methods. For example, it is expected that using parameters such as time of reading content or learner's emotion during studding could improve the evaluation process.

Sometimes learners couldn't participate in tagging process because they didn't have experimented for it. In [8] suggested a method for proposed tags to users.

In following section, the evaluation of this method (TagAssessment), the system and dataset for do it are described in details.

4- Evaluation

To evaluate the relation of learners' tags and their understanding (and consequently proposed method), one e-learning system is designed. In this system, learners are able to read contents and tagging on them. After tagging process a simple test is given. In figure 3, some schemes of this system is illustrated.

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Table 1- statistical information of test

Total number of associations	Number of Participants	Average of viewed contents for each leaner	Average of tags that user assigned to each content	Average of number of words contain in each tag
1226	90	13.69	2.42	1.17

To test proposed method ninety students of the computer engineering and information technology department of Amirkabir University of technology were used. The contents that be used in evaluation were sixteen contents of "technology project management" BSc course. Nobody of participating student passed this course before and these contents for comfortably of these students translated to Persian language that is the first of them. However, student should use English words to tag contents. The students were asked to use tags related to the contents and don't assign irrelevant tags. Contents also are tagged with experts to compare learner's tags with them. In table1 statistical information of this test is shown.

It must be considered that not all the learners' tags could be processed because some of them are in Persian language or a few of them are bad spelled. As shown in table1, learners mostly used one word as a tag. Furthermore, in average they assigned 2.42 tags on each content. Each one association refers to all tags of a user assigned to the specific content. In the other words, one association explains the relation between a user and a content. Delectation of useless tags caused to remove some associations. The number of these associations after deleting ineffective tags is 972.

On the other hand, WordNet is a general dictionary, and it doesn't support special words in specific areas. To solve this problem this dictionary a little has been expanded in the domain of Information technology project management. In the other words, some new words that related to system's contents were added to WordNet ontology.

As mentioned before after each tagging process a simple test was given. The results of these tests were applied to compare with TagAssessment method. The results of tests were desecrated in four degrees (A, B, C and D). To evaluate proposed method, the results of TagAssessment method compared with results come from these tests. The outcomes of comparing two methods are given in table2.

The difference between two methods is calculated with the difference among levels that they determined to measure learner understanding from contents. For example, if test method determined that grade of user, U in content C_1 is B and TagAssessment method established this degree as D, the difference between to method is 2.

The average of two methods differences on all associations is 0.53. It means that in average, the TagAssessment method evaluated understanding level of the learners greatly similar to regular assessment. In 64% of associations the TagAssessment worked exactly like test method. Furthermore, in 24% of remain associations it worked very similar and its results are acceptable.

The worth case is when one method detect level A and another method identify D. In Our results this situation just happened in 24 times that is really a small number than 972.

Table 2- Result of test

Useful Association	Average of difference	Number of 0 difference	Number of 1 difference	Number of 2 difference	Number of 3 difference
972	0.53	620	237	91	24

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5- Conclusion

In this paper, a novel method to assess learners is purposed. This method that called TagAssessment assesses learners based on semantic distance of learner tags and concepts covered by contents. To calculate semantic distance WordNet ontology is used.

To evaluate this method one system with sixteen contents is designed and ninety students were asked to use it. The results of TagAssessment are compared with results of direct test method. This compression showed that for 64% of Times both methods have same outcomes. Also for 24% of remain Times it worked very similar and its results just have one level distance.

Using just this method to evaluate learner is not perfect and it is better to apply this method jointly with other methods.

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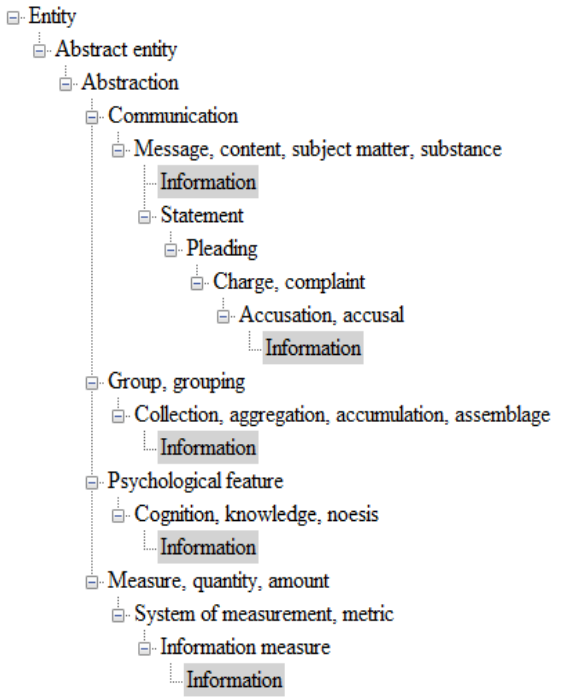

Figure2 – A simple word position in ontology (WordNet Ontology)

Figure 3. Three schemes of system- in the top welcome page – In the middle content view

– In the bottom test view