Improving E-Learning Performance Through Social Communications

By Mohammed Yaqub

Abstract- E-learning is a way of teaching by using modern communication mechanisms of computer networks, multimedia of (sound, image and graphics), electronic libraries and search mechanisms, as well as Internet portals, whether remote or in the classroom. The aim is to use all kinds of technology for the delivery of information to the student in the shortest time with less effort and greater benefit. In this paper, we attempt to solve the problem of isolating or missing social interactions of learner request, the professor perhaps not be always involved in the request and the missing of competitions and quality. To improve e-learning, it is recommended to it with sociality. In this paper, we used some algorithms such as (k-mean algorithm, decision-tree algorithm, Apriori algorithm, course rank algorithm) as tools to achieve our goals in finding most suitable friend and most suitable course for the user's.

Keywords: collaboration technologies, e-learning, open social learning network "osln", learning management system, social network.

GJCST-H Classification: I.2.6 C.2.0

IMPROVINGELEARNINGPERFORMANCETHROUGHSOCIALCOMMUNICATIONS

Strictly as per the compliance and regulations of:

Improving E-Learning Performance Through Social Communications

Mohammed Yaqub

Abstract- E-learning is a way of teaching by using modern communication mechanisms of computer networks, multimedia of (sound, image and graphics), electronic libraries and search mechanisms, as well as Internet portals, whether remote or in the classroom. The aim is to use all kinds of technology for the delivery of information to the student in the shortest time with less effort and greater benefit In this paper, we attempt to solve the problem of isolating or missing social interactions of learner request, the professor perhaps not be always involved in the request and the missing of competitions and quality. To improve e-learning, it is recommended to it with sociality. In this paper, we used some algorithms such as (k-mean algorithm, decision-tree algorithm, Apriori algorithm, course rank algorithm) as tools to achieve our goals in finding most suitable friend and most suitable course for the user's.

Keywords: collaboration technologies, e-learning, open social learning network "osln", learning management system, social network.

I. Introduction

Since the 1990s, the rapid development of information knowledge not only provided a boost to the revolution in a community-wide application of information technology, but also led to revolution in educational information technology. Educational information technology gradually break with the traditional theories and ways of education, and drive the reform of education in its mode, thought, theories and concepts , basis of these over an educational goal named "lifelong learning" was put forward to the public. With the deepening of Education information technology [1][2].

E-learning allows learners individually to learn "any location, anytime" and offers immediate access to specific information. E-learning is essentially the coalition practice unlike other technologies. E-learning technology is not mature and can find the multiplicity of standards [3][4]. E-Learning Revolution is a process of learning by enabling new technologies, which will hopefully be offered a learning process efficient and effective, which does not exist today [5]. E-learning teaching design is a complex project that involves many recent theories of course [6].

The root of e-learning is not paradigm shift from what went before but growth and development from previous practice and theory [7]. A social network is a

structure formed by people and by connections between people, with the connections enabling interactions and exchange of information and influence [8]. Social networking is definitely not a new phenomenon in the field of education and teaching. It could be claimed that at some point in history we forgot the importance of social network in the learning process 9]. This phenomenon not affect only the way how learner perceives education based on Social Network but also affect how training establishment can achieve their goals related to e-learning. All these reasons require greater attention to the evaluation of e-learning systems [10]. The system evaluation is not just the final phase of the process of software development, but also it should be seen as an important information source throughout the complete software life cycle [11].

a) Clustering in E-learning

Clustering is a data mining that divided the data into groups where learners belong together. Each learner is assigned to the group that is most similar to each other's. Clustering doesn't require a prior knowledge of the groups that are formed. Many algorithms to apply clustering. The most famous clustering algorithm is the K-Means algorithm presented by J.B. Mac Queen in 1967 [12]. It's one of the simplest unsupervised education algorithms, it's very fast [13] and iterative in nature [14] that used to classify features into k number of group. The grouping is done by minimizing the similarity between the learners and the corresponding cluster centroid [13] where learners are moved among the set of cluster until required set is reached. In our proposed system, analysis of social networking sites is totally dependent on clustering algorithms [14]. We cluster students based on information taken from user profile. Initially we choose learner preferences as the clustering criteria. The most specific pre-processing method is a compilation method to generate patterns that would work as heuristics to design social networking more effective sites. To make up for this, individualization can be achieved by association rule technique. The advantages to first apply clustering is not only to scale down the candidate sets, but also to guide association rule into a more focused area where high quality, personalized recommendations can be made.

Author: Anbar, Iraq. e-mail: yaqubmoha@gmail.com

b) Association Rules in E-learning

Association rule is usually divided into minimum support is applied to find all frequent itemsets in DB and these frequent itemsets and the minimum confidence constraint are used to form rules [14]. We use Apriori Association Algorithm that is an influential algorithm for frequent exploration itemsets for Boolean association rules [12]. Apriori Association rule used to mine the frequent styles in database. Support and confidence are the normal method that used for measuring a quality of association rule. Support for the association rule X->Y is the percentage of transaction in DB that contains XUY. Confidence for the association rule is X->Y is the ratio of the number of transaction that contains XUY to the number of transaction that contain X. Support and confidence formulas are defined as [14]:

$$supp(A \rightarrow B)$$
$$= \frac{\# \ records \ contaning \ for \ Both \ A \ and \ B}{Total \ Records}$$

$$conf(A \rightarrow B) = \frac{\# records \ contaning \ for \ Both \ A \ and \ B}{records \ contaning \ A}$$

The main aim of this paper is to build e-learning system in the form of open social learning network using enhanced e-learning integrated with social techniques. The system should be capable of improving the overall performance of student activities similar to "face to face" traditional model , improving the overall timing of user's actions, forming a scalable e-learning framework for any type of users and instructors, finally efficient and easy learning system that students can interact with it.

This paper goes as follows: in section 2 we present a related work of previous utilization of social network in e-Learning. Section 3 presents the proposed framework and offline and online components. Section 4 presents the experimental results and evaluation of proposed system. Section 5 presented conclusion of this paper. Paper ends with references.

II. RELATED WORK

In many other systems, and although many of advanced algorithms and tires are designed for describing the e-learning, and these frameworks, such as:

Blackboard provides the foundations to build a society both learning complex and dynamic. Perspectives theory emerging online education based on clearly limits and creates new structures for the learning process, and off-campus [15]. It's one of the more successful and popular commercial e-learning systems. It can be extended according to own needs [15].

Moodle it is very popular free Course Management System (CMS) that has its origins in the 1990ies. In 2003 the company moodle.com was launched to provide commercial support, managed hosting, consulting and additional services. Since 2005 There are fixed team of lead developers employed by Moodle, aside from a large community of developers and supporting organizations contributing source code, ideas, etc. to the project. The general design tries to consider pedagogical principles and learning theories. The lesson module of Moodle also offers different learning paths. As the user's possible answers on a question could be used as starting points for different learning paths, some kind of "weak adaptively" is supported [17][18].

Web-based Learning Environment plays an important role for education today. Currently, the students have more options in studding compared to such as Virtual-U and WebCT [19], **WebCT** (Web Course Tools) was developed in 1995 by Murray Goldberg, a faculty member at the University of British Columbia. Universal Learning Technologies purchased WebCT in 1999. WebCT integrated means of communication, including a bulletin board, chat rooms, e-mail and calendar on site WebCT. In addition, it can be graphics, audio files and video to the integration site WebCT. These features facilitate interaction between faculty and student members [20].WebCT offers a collections of features and tools that may be added to courses including chat system, Conferences system, student track progress, and maintenance of grade distribution, access control, and navigation tools, contests marked cars, E-mail, calendar and, of course, and student home pages[21].

ATutor as open source system supporting learning content management and specifically consideration of matters relating to access and the capability to adapt. It was first released in 2002 after two studies conducted that evaluated the accessibility of learning platforms to people with disabilities. Several features are planned for the immediate future, including a barrier free authoring tool and a streaming media server [22].

III. THE PROPOSED FRAMEWORK

a) Proposed System

To overcome the problem of traditional e-learning, we proposed a hybrid framework that satisfies the social e-learning framework supported by new features. Agent feature, each agent in society holds a collection of resources such (Profiles, Friendship, and Courses) which are rated by using the algorithm. Collaborative feature, each scholar and instructor has his own sharing and chatting tool which displays the disposal. Semantic Support feature, each scholar and instructor has been supported with intelligent process which suggests the best friend.

Online social network is collected of operators, links, and collections. All online social networks, to fully participate in the social network on the net, a user necessity register with the site. The user profile composed by the site contains information on voluntary

users, which can be a fake sometimes. After a user registered in a site, the user then creates links to other users.

Here, forming links users for various motives: the users can be real-world acquaintances, business associates; they can segment some common interests; or they are interested in each other's contents. For a user, the set of users with who has links are called the contacts of the user. Online social network s such as Orkut, Renren and Flickr, according to the user's explicit graph form, share content, and location. For greatest online social networks Renren net; a user's contacts and his/her profile are often visible to those users who visit the user's account. Some locations like LinkedIn only let operators to display information (contacts and profile) of its contacts.

Users can publish messages to groups and upload shared content to the group. Several of these sites, links among members are public can creep automatically to capture and study of a large portion of users connected. Figure1.1 shows the flowchart of the proposed sytem.

User registers and logs into system to complete the profile with all information needed.

- If user is a student he can do:

Edit his Profile
- If he completed his profile information update and he received friend suggestion closest to his information then :

((Add Closest Friend, Add Closest Course, Add the best friend with the high weight in activity ((comment, sharing ,number of user login)), high degrees in exercise and quiz finally the number of Most Frequent Asked)) .

- Else found for friend and add him or update profile information

((found for Friends, Search for interested course, search for professors, Search for instructors, he can take exam, he can take Exercises, He can take course , he can share resources, he can comment on status he want, he can add student, instructor and professor, he can logout)).

- If the user is not a student (**Instructor/professor**) then he can do:

    Edit his Profile:

((He can create Course, he can assign students to course, he can create exam he can create exercises, he can share resources and comment on status he want ,he can logout)).
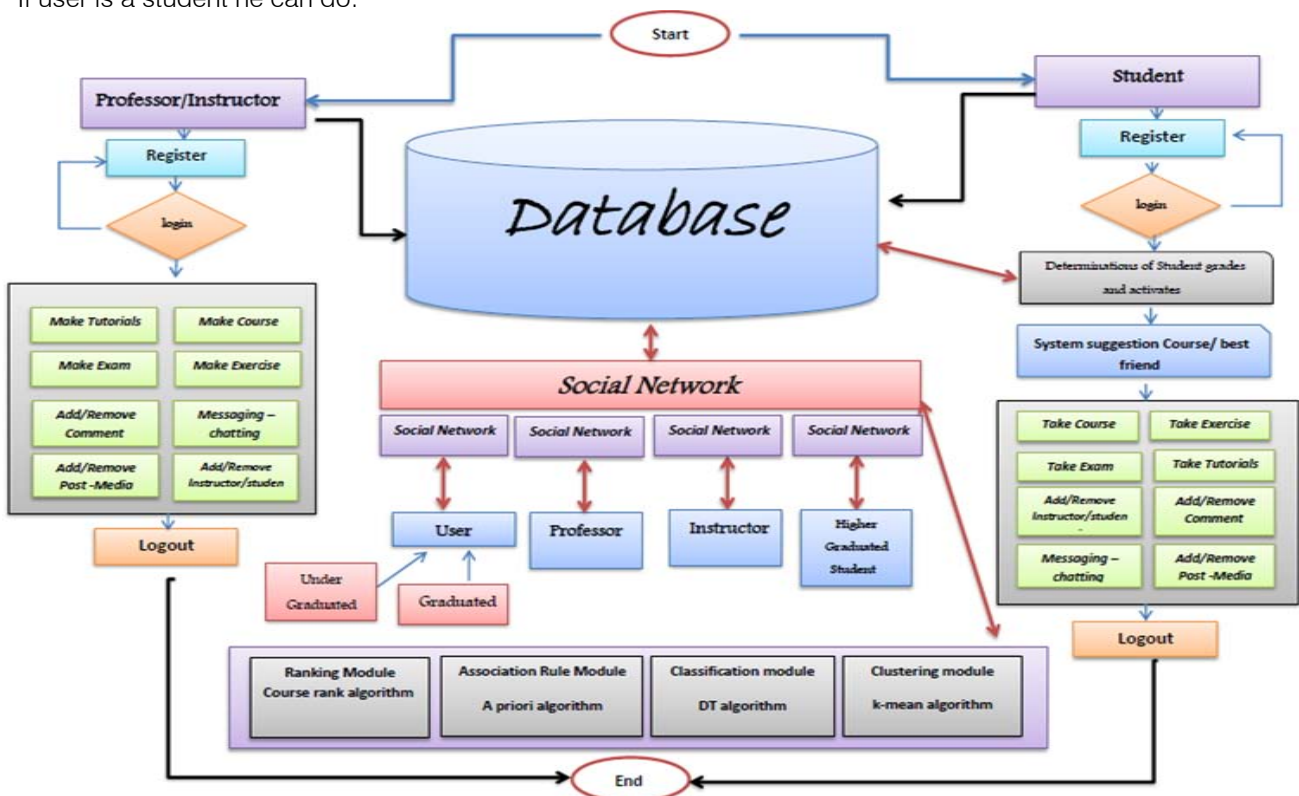

Figure 1.1: flowchart of the proposed system

The main steps of a proposed system:

Step 1: Clustering Module

Input: Scholars profiles from Dataset

Output: Students Clusters and Clusters centers

Function: using K-means algorithm, it divided the data into groups that belong with learners. Each learner is assigned to group that is the most similar to him/her.

Step 2: Classification Module

Input: New scholar profile from Dataset

Output: Scholar specified class and similar friends

Function: busing decision-tree, it classifies new scholar into specified class which resulted from K-means algorithm in the step 1. and, assign the remain scholars in the class as friends to him/her.

Step 3: Association Rule Module

Input: Courses and Scholars Classes from Dataset.

Output: Courses Association Rules.

Function: by using A-priori algorithm based on association rules to show how the relation between courses and scholars.

Step 4: Ranking Module

Input: Recommendation of the student friends and courses from the previous sections.

Output: Ranked courses and friends.

Function: by using Course Rank algorithm based on courses to rank the recommendation output of courses and friends which the most similarity to new scholar. Figure 1.2 shows a block diagram of the proposed system.
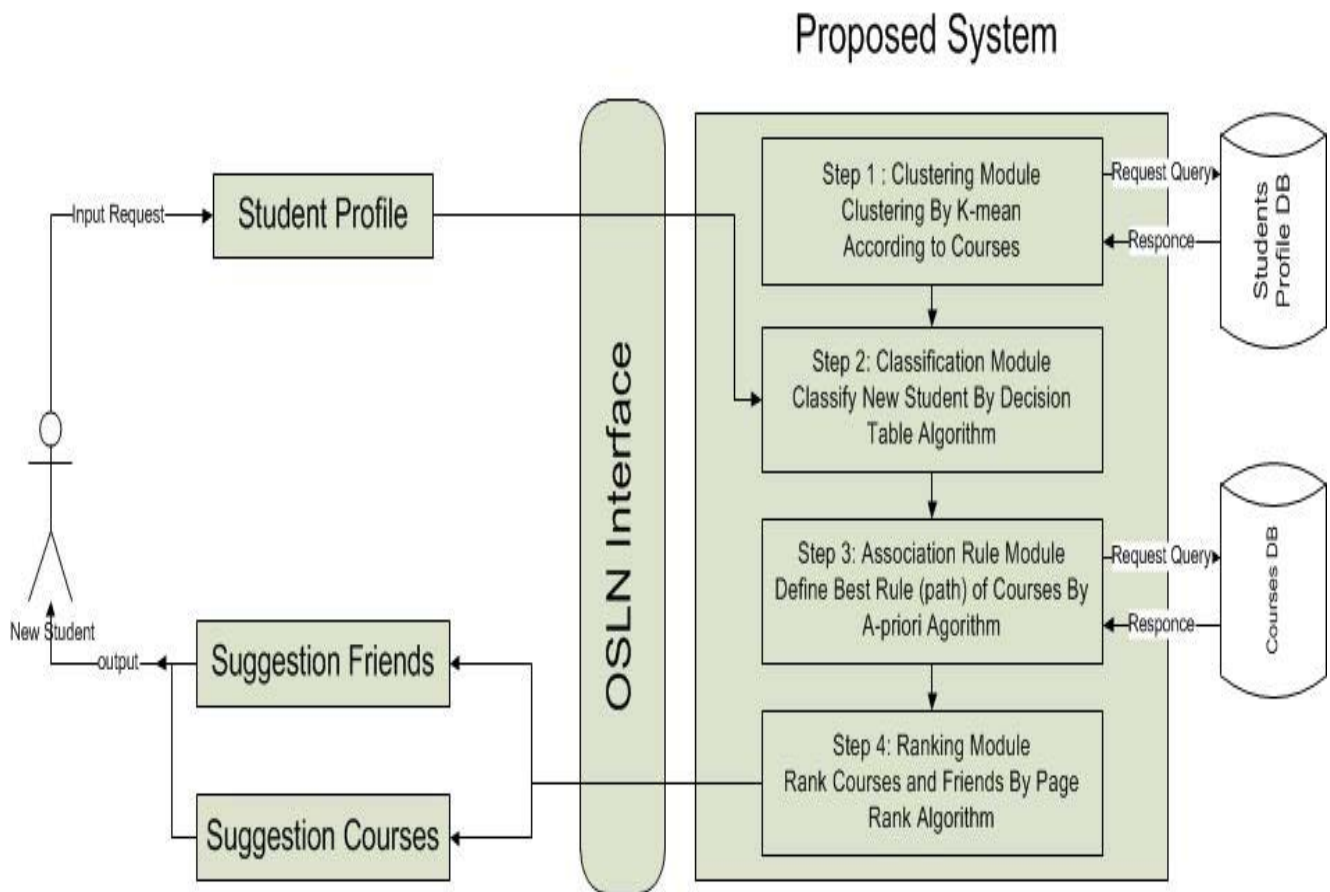

Figure 1.2 : Block Diagram of the Proposed System

b) Offline and Online Component

We can classify Open Social Learning Network **OSLN** components into Online and Offline components that perform the required tasks before users are connected to the system, so when users ask for queries, OSLN can respond to them. Offline component consist of cluster the users and apply association rule on these clusters. Online component consist of ranking to generate lists, Figure 1.3 presents the classification of OSLN components.
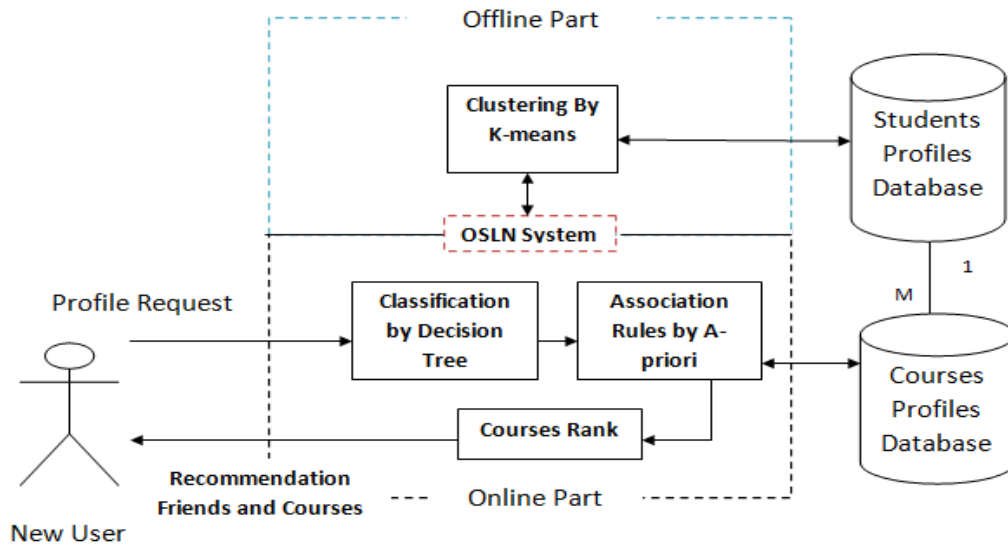
Figure 1.3 : Offline and online components of OSL

IV. EXPERIMENT RESULT

a) Data Base

The systems database table and relationships were developed using a relational database management system (RDBMS) My SQL version :5.5, We need Apache and used version 2.2.17, with PHP Language version 5.3 To evaluate our proposed system we did our experiments using data of 500 students and 9 courses. The entity relationship diagram (ERD) is shown in Figure 1.4, and table 1 shows the Weighted list of Interested Courses.
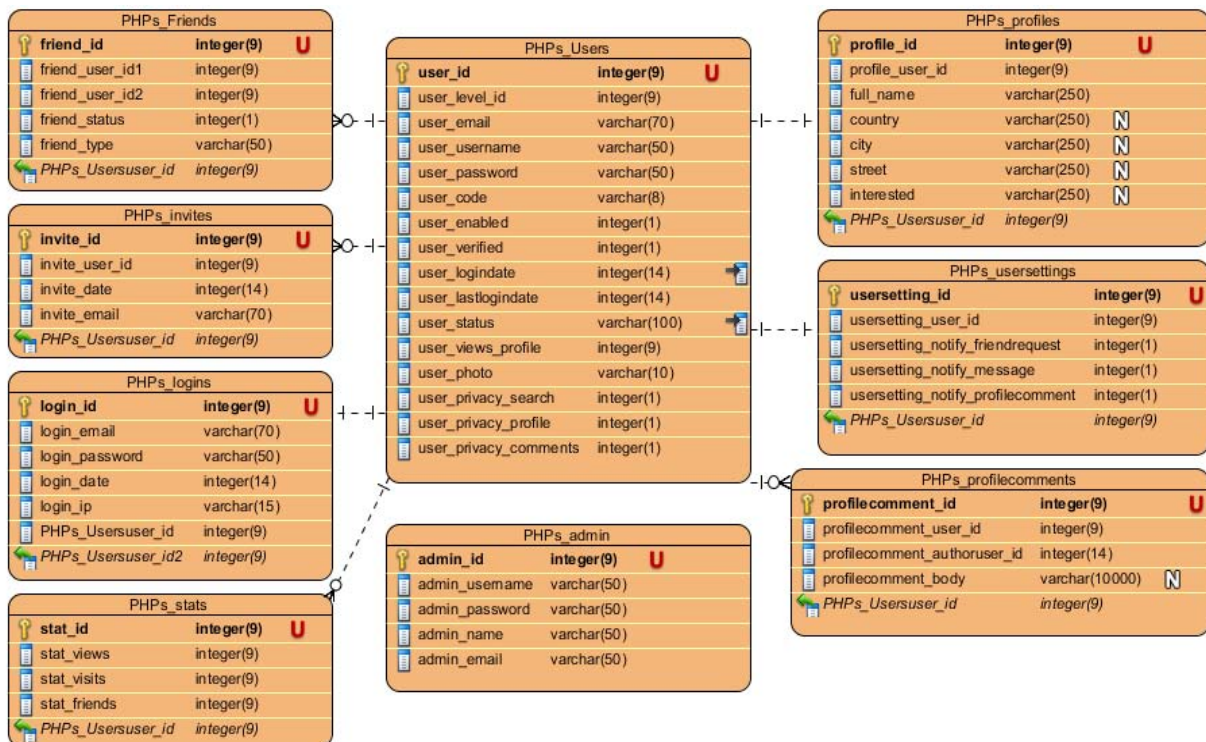

Figure 1.4: Database Table Relations Diagram

Table 1: Weighted list of Interested Courses

Course Name	Interested Weights
Introduction to programing	99
Data Structure	61
Algorithms	50
C++	41
Java	75
Oracle Database	50
Object Oriented	25
Information Security	42
SQL server	57

b) Clustering Module

Clustering is a data mining technique that separates the data into groups whose learner belong together. Our clustering module utilizes k-mean cluster algorithm to build cluster of the students. Learners clusters are based on users interests. After applying K-means clustering algorithm by using data mining tool (WEKA), we get the results that shown in Table 2.

Table 2 : Distribution %of students by clusters

Cluster	%of student in the clusters
Cluster 0	7%
Cluster 1	17%
Cluster 2	14%
Cluster 3	8%
Cluster 4	17%
Cluster 5	8%
Cluster 6	15%
Cluster 7	9%
Cluster 8	5%

c) Association Rule Module

This module used to show the relation between the course and learner. Learners will study from course which they are interested. In this method we make combination of Clustering and Association Rule Algorithm. First we apply the Simple K-means algorithm to sample data of interactions, we will get some clusters. Then apply the A priori algorithm to the data after cluster. Table 3 we show the result of A priori algorithm after applying on Clustering Module:

Table 3 : Result of A priori algorithm after applying on Clustering Module

Parameters in algorithm	Result using A priori Association Algorithm by WEKA
Minimum support: 0.1 (50 instances) Minimum metric <confidence>: 0.9 Number of cycles performed: 18	1. Java=i Oracle Databases=i 86 ==> total=s 86　conf:(1) 2. Algorithms=i C++=i 55 ==> total=s 55 conf:(1) 3. Introduction to Programming=i Oracle Databases=i 54 ==> total=s 54 conf:(1) 4. Java=i Oracle Databases=i Object Oriented Development=i 54 ==> total=s 54　conf:(1)

d) Ranking Module

After execute the Clustering module and Association rule module. By using course rank algorithm running to recommend learning objects to learners. In this module the recommendation of most suitable course and most suitable friend, by using equation (3) calculated course rank weight. Table 5 show the course rank Wight for each course in the proposed system.

$$R(C_i) = \frac{pr_i\, C_i}{L_i} \qquad (3)$$

Where
- Pr_i is the A-Priori Result for the course C_i
- L_i is the number of students interested for course C_i

Table 4 : Weighted list of Courses Rank Algorithm

Course Name	Course Rank Weight
Introduction to programing	0.55
Data Structure	0.016
Algorithms	1.1
C++	1.34
Java	2.16
Oracle	1.71
Object Oriented	1.14
Security	0.023
SQL server	0.017

e) *Recall and Precision Concept*

Precision and recall are the basic measures used in evaluating quest strategies, by using equation (1) and (2) calculated it [23]. To evaluate a proposed system (**OSLN**) we use measuring the accuracy of usage prediction, when using prediction accuracy on result of rules of association module, we found 0.859 for precision and 0.778 for recall, that mean a good recall and a good precision of proposed system, in Table 5 we show the Recall and Precision of the system by using the weka system the result show the Recall and Precision **is** a good of a proposed system:

$$Precision = \frac{True\ Class\ A}{True\ Class\ A + Flase\ Class\ A} \tag{1}$$

$$Recall = \frac{True\ Class\ A}{True\ Class\ A + Flase\ Class\ B} \tag{2}$$

Table 5 : Result of Recall and Precision

Cluster Name	Precision	Recall
Introduction to programing	0.941	0.866
Data Structure	0.883	0.722
Algorithms	0.833	0.754
C++	0.756	0.756
Java	0.953	0.884
Oracle	0.879	0.821
Object Oriented	0.923	0.842
Security	0.778	0.688
SQL server	0.793	0.674
Weighted Avg.	**0.859**	**0.778**

f) *Evolution of the System Suggestion most suitable friend*

1. We calculate **most suitable friend** by using the equation (4):

$$BF = \sum_{i=0}^{n} Fw_i / n_f \tag{4}$$

Where
- BF: Best Friend
- F: Factor
- n_f: Number Of Factor
- w_i: Degree of Importance Factor

2. We calculate **Most Frequent Asked Questions** by using the equation (5):

$$MFQ = \sum_{i=1}^{n} MF_x / n \tag{5}$$

Where
- **MFQ** : Most Frequent Asked Questions
- MF_x: Number of Frequent Asked Questions
- n: Number of Example

3. We calculate **Exercise and quiz** by using the equation (6)

$$E = \sum_{i=0}^{n} E_n / n \tag{6}$$

Where
- E: Exercise

- E_n: Number of Exercise Degree
- n: Number of Exercise

4. *Comment:* Suppose that the Comment measured from 60, Where the number ignores every comment over 60 is calculated the following equation (7):

$$CA_u = \sum_{i=0}^{n} C_n / 60 \tag{7}$$

where
- CA_u: Average of Comment user
- C_n: number of Comment user number

5. *Share:* Suppose that the sharing measured from 60, Where the number ignores every sharing over 60 is calculated the following equation(8) :

$$SH_u = \sum_{i=0}^{n} S_n / 60 \tag{8}$$

Where
- SH_u: Average of sharing user
- S_n : number of Sharing user number

6. *Number of User Login:* Suppose that the degree of Number of User Login measured from 60, where the counter ignoring each User more than 60 and calculates the following equation (9):

$$L_u = \sum_{i=0}^{n} U_n / 60 \tag{9}$$

Where

- L_u: average of user login
- U_n: Number user login

7. We can calculate activity by using equation (10).

$$AC = \sum_{i=0}^{n}(CA_w, SH_w, L_u)/3 \quad (10)$$

In table 6. The system show the suggestion most suitable friend to student (ID-125) that is Register in Java The result of the system most suitable friend is the student (ID-185).

Table 6 : The system show the suggestion most suitable friend to student (ID-125)

User –ID	Activity			Most Asked questions MFQ	Exercise & Quiz	most suitable friend
	Comment	Share	Number of user login			
103	70%	40%	75%	90%	60%	67%
127	50%	38%	35%	30%	20%	35%
157	45%	52%	77%	39%	68%	56%
185	83%	88%	92%	89%	95%	89%

g) Critical Evolution for All Students

In our work we based on many critical to check student active by calculate Table 7 show the relationship between profiles and activity with other parameters like performance, accuracy and security. These equations used to inform the values in the table.

Profile: During the experiment results, define profile as the ratio of the Setting Completion by summation of its value.

Performance: During the experiment results, define performance is the average profile completion and user activity

Accuracy: Throughout the experiment results, define accuracy as the product of the Performances multiply in 0.9.

Security: During the experiment results define security
If (activity > 50) then Security = activity / 2
If (activity < 50) then Security = activity * 2
If (activity = 50) then Security = 50

Table 7: show the relationship between profiles and activity with other parameters like performance, accuracy and security for each student

User – ID	profile	Activity			performance	Accuracy	Security
		Comment	Share	Number of user login			
100	87	62%	75%	65%	77%	69%	44%
101	52	47%	33%	52%	54%	49%	41%
102	77	87%	86%	96%	57%	51%	60%
103	94	25%	35%	63%	68%	61%	81%
104	65	52	47	43	56%	49%	94%

V. CONCLUSION

We have attempted to provide our interpretation of the current social-technical educational system shaped by technologies and practices of the "Knowledge Society" to locate the role of learning and learners in a lifelong perspective. We believe that both users' attitudes and available technologies are mature to let us envisage that each network user could easily engage in a lifelong learning personal experience if properly lead by appropriate methodologies and sustained by accordingly designed and developed personal learning environments. Furthermore, to this extent we have provided a model to schematize the knowledge flow occurring during an effective learning experience in a connectionist environment. The purpose of this model is twofold: from one side it may be used by personal learning environment designers as a guideline for checking if all phases and enabling conditions are supported by the integrated tools; on the other side it may be used by instructors or designers to set up learning activities. Moreover, we proposed efficient and effective framework and algorithm for clustering, classification and association rule in online social networks and for maximizing the influence in such networks. We would like to continue enhancing the efficiency and efficacy of our approaches for association rule and influence maximization problems.

REFERENCES REFERENCES REFERENCIAS

1. Chen Huandong, Wu Shulei, Song Chunhui," Analysis and prospect on the E-Learning System Instructional Design", International Symposium, ISISE2008. IEEE Computer Society: 303-306, 2008.
2. Marcus, N., Ben-Naim, D., Bain, M.,"Instructional Support for Teachers and Guided Feedback for Students in an Adaptive eLearning Environment", In: Eighth International Conference on Information Technology: New Generations (ITNG), 2011, IEEE.
3. H. El-Bakry and M. Hamada, "Enhancing Adaptive Mobile E-Learning by using Cloud Computing", In Active and Collaborative Learning: Practices, Problems and Prospects", M. Hamada, (Ed.), Pp. 139-165, NOVA Science Publisher, ISBN: 978-1629480664, Dec. 2013.
4. C. Huandong, W. Shulei, S. Chunhui, and C. Mingrui, " Research on the Learning Theory of E-learning", Fifth International Joint Conference on INC, IMS and IDC, NCM'09, 2009, IEEE,.
5. K. Anandakumar, K.Rathipriya, A.Bharathi, " A Survey on Methodologies for Personalized E-learning Recommender Systems", International Journal of Innovative Research in Computer and Communication Engineering, Pp.4738-4743 , Vol. 2, Issue 6, 2014.
6. Song Chunhui, Chen Juntao, Wu Shulei, Chen Huandong , Zhan Jinmei, Kang Dong, " E-Learning System Model Construction Based Constructivism", Fifth International Joint Conference on INC IMS and IDC, 2009, IEEE.
7. Joi L. Moore, Camille Dickson-Deane, Krista Galen, " e-Learning, online learning, and distance learning environments: Are they the same? ", Internet and Higher Education 14 (2011) 129–135, Elsevier.
8. Angela Yan Yu, Stella Wen Tian, Douglas Vogel, Ron Chi-Wai Kwok, "Can Learning be Virtual Boosted? An Investigation of Online Social Networking Impacts", Computers & Education An International Journal, 55(4), Pp.1494-1503, 2010, Elsevier.
9. Ahmed Abou Elfetouh S. and Hazem M El-Bakry, "A Novel Adaptive Mobile E-Learning Model", International Journal of Computer Applications, Pp.12-25, Volume 63– No.14, 2013.
10. Zaidieh, "The Use of Social Networking in Education: Challenges and Opportunities ICT", collage of information and communication technology, IIUM KL, Malaysia 2012.
11. Yassine Jamoussi, Zuhour A. Al-Khanjari and Naoufel Kraiem, "A Framework to Evaluate E-learning Based on Social Networking", International Journal of Current Research and Academic Review, Volume 2 Number 4, Pp. 26-42, 2014.
12. J. Han, Jian Pei and K. Micheline, "Data Mining Concepts and Techniques: Third Edition", Morga Kaufmann Publishers is an imprint of Elsevier. 225 Wyman Street, Waltham, MA 02451, US 2000.
13. D. Rajput, R. Thakur, G. Thakur, and N. Sahu, "Analysis of Social Networking Sites Using K-Mean Clustering Algorithm", International Journal of Computer & Communication Technology, 2012.
14. B. Sunita and L. Lobo, "Best Combination of Machine Learning Algorithms for Course Recommendation System in E-learning", International Journal of Computer Applications, 2012.
15. Daniel Chandran and Sunil Kempegowda, "Hybrid E-learning Platform Based on Cloud Architecture Model: A Proposal", International Conference on Signal and Image Processing, 2010 IEEE.
16. Fatmah. S. Ba-Mohammed, Haithm El-Ghareeb, A. M. Riad, "E-Learning Recommendation System Based on Social Networks", International Journal of Information Science and Intelligent System, 3(4): 25-44, 2014.
17. Azough S., Bellafkih M., Bouyakhf El H., "Adaptive E-learning Using Genetic Algorithms", JCSNS International Journal of Computer Science and Network Security, VOL.10 No.7, July 2010.
18. Romero, C. & Ventura, S., "Educational data mining: a survey from 1995 to 2005". Expert Systems with Applications. 33(1), 135-146, 2007.
19. Nuanwan Soonthornphisaj, Ekkawut Rojsattarat, SukanyaYim-ngam", Smart E-Learning Using Recommender System", Springer Link, ICIC, LNAI4114, PP.518-523, 2006.
20. Bonk, C. J., Wisher, R. A., & Lee, J. Y., "Moderating learner-centered e-learning: Problems and Solutions Benefits and implications", In T.S. Roberts (Ed.) Online collaborative learning: Theory and practice, Hershey, PA: Idea Group, pp.54-85, 2003.
21. Williams R., "Integrating Distributed Learning with Just-in-content Knowledge Management. Electronic", Journal of e-Learning, 1 (1) 45-50, 2003.
22. Péter Lengyel, Miklós Herdon, Róbert Szilágyi, "Comparison of Moodle and ATutor lmss", Summer University on it in agriculture and rural development – 2006 Debrecen, Hungary.
23. William H. Walters," Google Scholar Search Performance: Comparative Recall and Precision " portal: Libraries and the Academy Volume9, Number 1, January\2009, pp.5-2410.1353/pla.0.00 34.

Global Journals Inc. (US) Guidelines Handbook 2015

www.GlobalJournals.org