

BEHAVIORAL BASED PREDICTION OF LEARNER'S IN E-LEARNING SYSTEM

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Abstract : Education plays an important role in human development. In current time people are more aware of their rights and responsibilities about their society. And all these things are achieved by education. The educational system is smartly changing day by day. The distance learning is the most important factor in the current time. And this is achieved by an online learning system. Here learners can start their education or courses from a long distance. Online learning is providing a great platform for learners who want to learn but was not able to physically appear there. Here in this e-learning system, the student can enroll in the courses. Give the exams. View the results and if found the low performance then can improve it by participating in groups and forums. Faculties help them in forums to solve their difficulties. The system will observe the learners behavior, view their performance and assist them to upgrade their skills.

Index Terms - Predictive Learning Analytics, Social Learning Network, Learning Outcomes Prediction, Behavioural Analysis, Performance Prediction.

I. INTRODUCTON

Education is the most important factor in the development of human civilization. So there are different ways are available for the human to learn the new thing. To improve their skills, knowledge, personality and performance people always trying to find the experimental things which help them to enrich their level. So to learn anything, they search such platforms which provide the existing thing in an innovative way. The proposed e-learning system is the best platform for learners to improve their performance. In the proposed system, activities of learners will be tracked by observing their behavior and provide the study material. Take their exams and check their result. After viewing the result system will find the students who have low scores. To detect the weak subject of student deep learning algorithm is used. After examining the student, to enrich their knowledge in weak subject decision support system will form a group of a student where they can discuss their problems with their friends who have a good knowledge of that particular subject. And also it adds one module known as a forum which also helps them to solve their problems. In this way, learners will improve in their weak topics and after that again give the exam to check their new performance.

II. LITERATURE REVIEW

The Literature review is the study of previous work of the existing system. Here it will study the previous work of the e-learning system.

C. G. Brinton, S. Buccapatnam, M. Chiang, and H. V. Poor, published a paper "Mining MOOC Clickstreams: Video-Watching Behavior vs. In-Video Quiz Performance," which is focus on learning outcomes. Researchers have developed predictive learning analytics to presage the different characteristics of students in advance. For example how they react on assessment [1],[2], how they interact with course content, their possibility of failure [3], final grades [4], dropout rate [5],[6], and whether forum intermediate will be needed [7]. This work focus on the unique case of learners in short courses where it does not consider the assessment data for modeling. Instead of that, this method completely depends on the content and the social learning network (SLN) behaviors.

C. G. Brinton and M. Chiang, published a paper "MOOC Performance Prediction via Clickstream Data and Social Learning Networks," focus on learners interaction with system. Here it shows how the learners interact with the system and in which way learners interact with the system. In this system [1], [5], [8], the video-watching clickstream data is used as a learning feature in open online courses. The content mode which considers here is interactive slideshows, articles, PDFs which are common in online courses outside of massively open online courses and the system permit the collection of this data too. This method is also based on day by day prediction rather than the prediction after some actions. For example- a quiz by quiz prediction which is [8], more practical for early detection in short courses.

C. G. Brinton, S. Buccapatnam, F. M. F. Wong, M. Chiang, and H. V. Poor, published a paper "Social Learning Networks: Efficiency Optimization for MOOC Forums," focused on social learning activities. A social learning network is developed from social learning sites which are widely used in the educational environment throughout the world. As the interaction of students with social networks is an increase day by day. Here to predict the performance of learners the system needs to track the behavior of learners or the interaction of learners with social networks. The recent studies consider the social learning networks in different learning platforms such as MOOCs [9], [6], [7], enterprise social networks [10], and Q and A sites[11]. Like the discussion forum in online sites, here in social learning networks, there is Q and A sites which are used by users for asking and answering the questions. The user is connected to the social networks which are tracked by the system for the prediction of their performance.

R. F. Kizilcec, C. Piech, and E. Schneider, published a paper “Deconstructing Disengagement: Analyzing Learner Subpopulations in Massive Open Online Courses,” which is focused on online course learning. The massively open online course expands in recent years, there is a number of analytical studies are available on this platform. In that some have a focus on a general analysis of learning mode for example: [12], [13], Studied learner engagement variation over time and across courses, others may focus on specific modes for example: forum [14], or analyze the rejection of participation over courses. Another work is identifying the classification of for enrolling for different courses in MOOCs.

III. PROPOSED WORK

The Proposed project is on e-learning system which recommends the study material on the basis of behavioral prediction of student performance. Here the first student subscribe for the course. After that when they started the course, the system will track their performance and action. And according to that, it finds out the students lack area and then recommends the study material. After that student study that data and can discuss in groups or forums. And then again solve the test and check out that their performance is improved or not. In this way here student can study the subscribed course and at the same time can improve their performance.

3.1 System includes three users are as follows:

3.1.1 Admin: - In this module, admin adds the tutors, manage the course and view the student performance.

3.1.2 Tutor: - In this module, the tutor can participate in the forum, can view students' performance.

3.1.3 Students: - In this module, the student can subscribe for a course, view the study material, solve the test, view their own performance, take a part in the forum, can see their group members.

3.2 The proposed system contain the modules which are as follows

3.2.1 Admin panel: - Admin is the very first module in the system. It has all the authority of the project. It manages users, project data, and modules and maintains the database of the system. In this project, admin first login into the system. Then as our work is on e-learning system it allows the students and tutors for registration. After that, it tracks all the users' activity and arranges their data. Then it also manages the courses. Admin has the authority to view the tutors, students' performance, and interaction of the users with the course. In this way, admin has the most important responsibilities of maintaining all the users, data and their work.

3.2.2 Tutor panel: - Tutor is another module in the system. Firstly tutor login into the system. It has the main function is to teach the student. To teach the student a particular subject or language firstly the tutors have to register that subject on the system. And then can teach that registered subject or language. Then the tutor has the authority to view the students' performance and their weak area. Then there is another module is a forum. So the tutor can also participate in the forum. Here in forum the tutor can solve the difficulties of students. To solve the student's difficulties tutor found another way is of group discussion. In this tutor will form a group of students. In this group, tutor includes some strong and some weak students in a particular topic. So that the strong students can solve their difficulties. In this way, tutor has this main authority to improve the student's performance.

3.2.3 Student: - Student is the most interactive module in this project. These entire modules which are formed in this project are only for students learning and their better performance. The focus of this project is on the improvement of student performance. To study the course firstly student has to register for the courses. Then after the registration student can login into the system. Then after the login student can subscribe for the courses which they want. After the course subscription student can view the study material related to their course. Then there are some tests related to that topic or course which student have to solve. After that test students will come to know their performance and they can also view their own performance. If he/she can found that they are weak in some topic then for that student's system will form a group. In this group, some strong and some weak student of that particular topic will add. So that the strong student can solve the difficulties of weak students. After that, there is another module to solve the difficulties of students in the forum. Here anybody can participate in that forum. When a student gives the test and come to know their weak area then this system automatically recommend the personalized study material to the student. So that he/she can take the use of that study material too for improve their performance.

3.2.4 Forum: - Forum is the medium where ideas and views can be exchanged. It the way for conversion to solve or discuss any problem. Here anybody can participate in the forum. Those who have any queries about any topic can post and anybody can reply on it. It is open to all. It is a convenient way to interact with anyone to solve the problem or discuss the topic. It is the fast replaying module because it is open to all.

3.2.5 Study group formation: - In this module, the system will form a group of students which contain the combination of strong and weak students. As some students are weak in some topic so that to solve their difficulties this group is formed. Some students who are weak in some topics can discuss their problem with their friends who have a deep knowledge of that topic. So this platform provides the way to the students to interact with their friends and can gain knowledge.

3.2.6 Weak Subject/topic Detection: - To improve the performance of the student the system will continuously work on them. For the student assessment system will track all the activities of the student, for example, their participation in the forum, how they solve the test and how they interact with the course content. Depending on all this activities system will find out the weak topic of a student with the help of a deep learning algorithm.

3.2.7 Study material recommendation: - As the system detects the weak topic of students, it will try to improve the performance of students. In this project, there are 3 modules which are used to improve the performance of the students. Forum, group discussion, and study material recommendation are the choices which are used. In this project, when student's weak topic is analyzed then the system will automatically recommend the study material for the student. It will help the student to upgrade their knowledge of the weak subject and for better performance.

3.3 Working Diagram:-

In this e-learning system, there are three users: Admin, Student, and Learner. To access the system student need to login into the system. For login first student have to register. After completing registration student can login and then subscribe for the course which they want to study. Then learners can get study material related to their course. After this completing or in between course there will a topic wise test for learners. After solving the test learners come to know their result or their weak topics. If the learner is weak in some topic then the system automatically recommend the study material to the learners. The learners again study recommended material and then participate in forum and groups to improve their knowledge and covert their weak topic into a strong topic. After studying the weak topic learners again solve the test for the weak topic to see how much they improve in that.

To find out the weak topic of learners deep learning algorithm is used. The working of a deep learning algorithm is as follows: First, it fetches subscribed course wise topic and then takes the topic wise actions. For example, in the first phase it will find out the topic wise wrong question then assign the weight for each question. The weight is set is either 1 or 0. Set $w_1 = \text{weight}$. In the second phase, it makes the list of topic wise wrong questions and then calculates the weight for different action i.e. calculates the summation of all the wrong questions. Set $Z = \text{Sum}(w_1 + w_2 + \dots + w_n)$ where Z calculate the value for all topics. Now calculate the Activate function value $\text{ACTVal}[t] = (1 / (1 + (\exp(-Z[t]))))$. In the third phase, it filters the topic on the basis of activation function value and calculates the average of the activation function value. Then it filters the topic whose activation value is less than the average value. After this transfer the remaining topics into the next layer. Repeat these steps to the output layer. And then in the output phase, the weak topic is detected. Another user in this system is a tutor. The tutor also needs to register to login into the system. Tutors work is upload topic wise study material take part in the forum and solve queries. Also, the tutor can view the performance of learners. This is how the system will work.

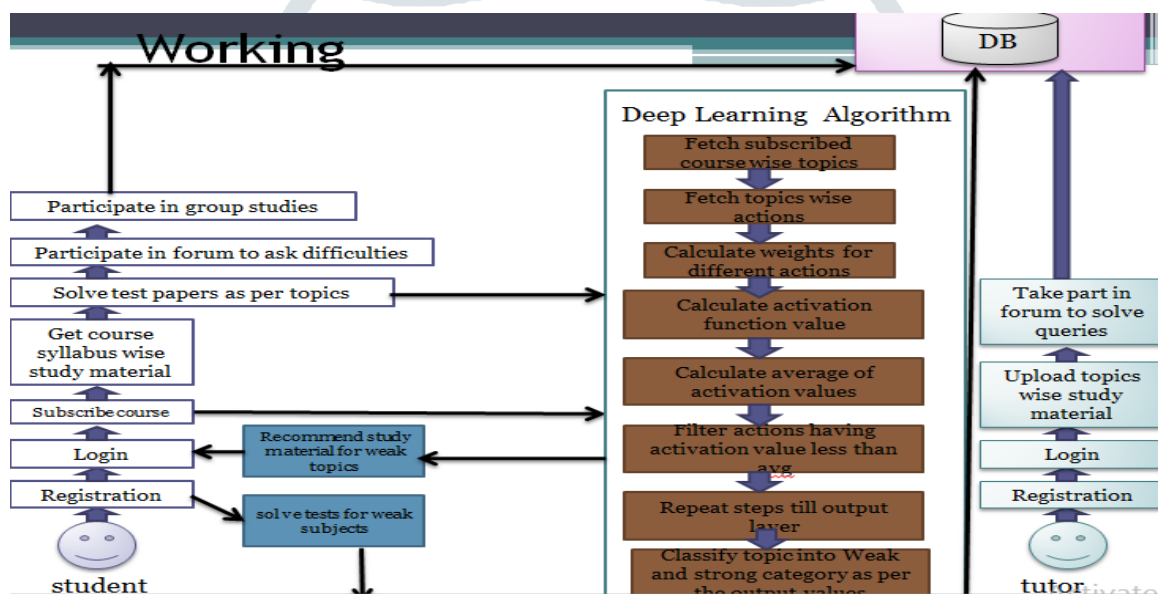


Fig 1. System Flow Diagram

3.4 Algorithm:-

The deep learning algorithm is used to find out the weak subjects of students. Deep learning is also known as deep structured learning or hierarchical learning. It is a part of a neural network family. In this, each level learns to transfer its input data into more abstract and composite representation. As in the image recognition application, the raw input may be a matrix of pixels; so their first representational layer may abstract the pixels and encode edges; then in the second layer they may compose and encode arrangements of edges; in the third layer may encode a nose and eyes; and in the fourth layer may recognize that the image contains a face. A deep learning process can understand which features optimally place in which level on its own. The "deep" in "deep learning" relates to the number of layers through which the data is transformed. More exactly, deep learning systems have a substantial credit assignment path (CAP) depth. The CAP is the chain of transformations from input to output. It describes potentially causal connections between input and output. Deep learning architectures are constructed with a greedy layer-by-layer method.

3.4.1 Algorithms steps:-

Step1: Input data. (Wrong questions data from the exam)

Step2: Classify that data. (classify wrong questions topic wise and assign a weight to each question, if q_1 belongs to topic1 then its weight is set to 1 otherwise 0, set $w_1 = \text{weight}$)

Step3: Calculate the activate function. (In this layer system will find out topic wise summation of no of wrong questions, set $Z = \text{Sum}(w_1 + w_2 + \dots + w_n)$ calculate Z for all topics and calculate activation function value $\text{ACTVal}[t] = (1 / (1 + (\exp(-Z[t]))))$)

Step4: Calculate the average of the activate function. (Filter topics on the basis of activation function value, calculate the average of activation function value, Filter topics having activation value < average, Transfer remaining topics to next layer)

Step5: Output. (Weak topic declaration)

IV. CONCLUSION

The work is on the prediction of learning outcomes of student's behavior in online short courses. The development of predictive learning analytics is challenging because of the lack of intermediate assessment. The proposed method completely depends on the behavior-based machine learning features, including a learner's interaction with the content integrated into a course and with one another in Social Learning Networks (SLN). Evaluation of collected data from short-courses hosted through the system as obtained high prediction quality by the middle stages of the courses, underscoring the capability of the method to provide early detection to the instructor. Observation says that the SLN attributes became the more useful set of behaviors for prediction over time. Where the content attributes provided better quality for earliest detection. Another observation says the proposed method can generate behavioral analytics

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