ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)

International Conference on Recent Trends in Computing and Communication (ICRTCC 2015)

Cochin College of Engineering & Technology

Vol. 4, Special Issue 1, June 2015

Efficient student learning analysis based on Q-learning approach

Dr.M.Balamurugan[1], S.Venkatesh[2]

Associate Prof., School of Computer Science Engg., & Applications, Bharathidasan University, Triuchirappalli, India[1]

Research Scholar, School of Computer Science Engg.,& Applications, Bharathidasan University, Triuchirappalli, India[2]

Abstract: The main objective of our process is to identify the student learning capacity and based on the marks and how to provide the teaching mechanisms of schools in centum marks. Especially to analyze the student learning capacity of physics subject. Provide that the real time student physics marks information as input. Based on the marks of the students we are going to identify the student capacity and predict the teaching methodology to that particular student. To identify the best learning method is used for Q-Learning algorithm. Q-Learning algorithm is a model free Reinforcement learning algorithm. It is mainly to identify the optimized solution. The optimized solution is identified based on the marks taken by the students in the exams.

Keywords: Cognitive styles, Q-Learning, questionnaire, heuristics, inferential, relational, Correlation Analysis.

I. INTRODUCTION

Learning is the important mechanism in the schools and colleges. There are so many ways to provide the learning. In our process, they are going to analyse the capacity of the students. The main objective of our process is to identify the student learning capacity and based on the learning capacity and how to provide the teaching mechanisms. Here to identify the capacity of the students and provide the real time student mark information as the input. It contains the term wise mark details. Use the term wise mark details and chapter wise details are generate the average mark for the each and every student. After analysing the student marks and identifies the student lacking subject. Identify the student lacking subject to provide the training on that subject. After identification to apply enter into the Q-learning algorithm. In the Q-learning algorithm is provide to analyse the student marks are stage by stage. These stages are based on the student marks and provide the student mark as input to the Q-learning algorithm. After providing the student mark as input it provides the teaching method as output to each and every student. This process takes place in first stage. After this stage completion, and identify the improvement of the student. Show the difference before this type of teaching and after this type of teaching. If some of the student level is not get improved means continuously repeat this process until the student gets improved. After the completion of this process, and show the final evaluated result. The teaching identification and score calculation is the output our Q-learning algorithm. To identify the best learning method is used to Q-Learning algorithm. The optimized solution is identified based on the marks taken by the students in the exams.

A. Cognitive Science

Cognitive science is unifying theoretical ideas in brain, behavior, computation. Brain is understands the process of neurobiological process and phenomena. Behavior is the experimental methods and findings from the study of psychology language, and the socio cultural environment. Computation is the power and limits of various representations coupled with studies of computational mechanisms. Cognitive science is the interdisciplinary scientific study of the mind and its processes. It examines what cognition is, what it does and how it works. It includes research on intelligence and behavior, especially focusing on how information is represented, processed, and transformed. Cognitive science consists of multiple research disciplines, including psychology, artificial intelligence, philosophy, neuroscience, linguistics, and anthropology. Cognitive Style is the process which is self generated, situational determines the conscious activity. In our process involve the cognitive style type of teaching to the students. Here we first analyze the student learning capacity by means of marks, and then predict the type of teaching to that student. [2]

B. Data Mining

Data mining refers to extracting or "mining" knowledge from large amounts of data stored either in data warehouses or other information repositories like database. Data mining has mostly got an important area for research. The term is actually defined misnomer. It is a non-trivial process of identifying valid, novel, potentially and ultimately understandable patterns in data mining. It can be view as the result of the natural evolution of information technology. Although data mining is still in its infancy, companies in a wide range of industries-including retail, finance, health care manufacturing transportation, and aerospace are already using data mining tools and techniques to take advantage of historical data.

The database has witnessed an evolutionary path in the development of the following functionalities. Processing of data collection and database creation and data management and advanced data analysis. Data mining techniques are the result of a long process of result and product developments are massive data collection, powerful multiprocessor computers, and data mining algorithms. [7]

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940
International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)
International Conference on Recent Trends in Computing and Communication (ICRTCC 2015)
Cochin College of Engineering & Technology
Vol. 4, Special Issue 1, June 2015

II. METHODOLOGY

A. Q-Learning

Q-learning is a model-free reinforcement learning technique. Specifically, Q-learning can be used to find an optimal action-selection policy for any given (finite) markov decision process (MDP). It works by learning an action-value function that ultimately gives the expected utility of taking a given action in a given state and following the optimal policy thereafter. Here to identify the best learning mechanism using the Q-learning. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.[1] [8]

B. Markov Decision Process

Markov decision process named after Andrey Markov provide a mathematical framework for modelling decision making in situations while outcomes are party random and party under the control of a decision maker. A policy is fixed and to evaluate this policy are called as passive learning. The policy is not fixed, can change it a little every time is called as active learning.

C. Algorithm

Set the student chapter marks and category value marks are current value.

Initialize marks 0 to 200
For each category values
Select random initial mark 0
Do while the goal value hasn't been reached
Select one among all possible values for the current value.
Using this possible value consider going to the next category.
Get max mark for this next value based all possible values.
Compute: max value (category, values) = current value (category, values) + chapter marks * max [max value (next category, all values)]
Set the next value as the current value.
End Do
End For [1]

D. Algorithm to Utilize the Q-Matrix

Set current value = initial value
From current value, find the marks with the highest marks.
Set current value = next category
Repeat 2 and 3 until current value = final value (200)
The algorithm above will return the sequence of values from the initial value 0 to the final value 200.

E. Algorithm Explanation

It choose between immediate and delayed rewards as agent observes the vector state Xt the choose and applies an action Vt as the process move to state Xt+1 the agent receives a reinforcement r(Xt Vt). The goal of training is to find the sequential order of actions which max the sum of the future reinforcement thus leading to the shortest path from start to finish. The gamma is closer to zero the agent will tend to consider only immediate rewards.

The gamma is closer to one the agent will consider future reward with greater weight willing to delay reward.

III. EXPLANATION

From the past exams experiences a fact has been found. To prove this fact, For samples who are studying their school student marks in physics subject, Government school, karur, India, were chosen to take up the experiment. Each student was examined for both quarterly, half yearly and annual Exam. Individual marks of the students' comprised quarterly, half yearly and annual Exam had been updated in the dataset. The description of the dataset is described in Table 1. Initially the real time student physics marks information as inputted in Q-Learning algorithm. The possible outcome of the data was given in the output area. The expected results were approximately.

TABLE I: DATA SET DESCRIPTION

Fields	Attribute Type	Size
S. No	Numbers	10
Name	Strings	50
Quarterly Marks (XI)	Numbers	3
Half Yearly Marks(XII)	Numbers	3

IV. RESULTS AND DISCUSSION

As it is explained above, the Q-learning algorithm was designed, inputted and tested with the training model. Training Rules of the Q-learning algorithm model depicted in Table 2. Pictorial representation of table 2 is depicted in Fig 1. Then we provide the real time student physics marks information as input. As a result, Q-learning was able to predict the students' success rate in exams as about good accuracy, which is depicted.

TABLE II: Model Training Data for Accuracy Prediction

XI th Half Yearly	*XII th Half yearly*	*Prediction of Success*
137	168	1
173	196	1
107	088	0
193	199	1
187	197	1
074	067	0
110	123	1
185	197	1
088	094	1
067	048	0

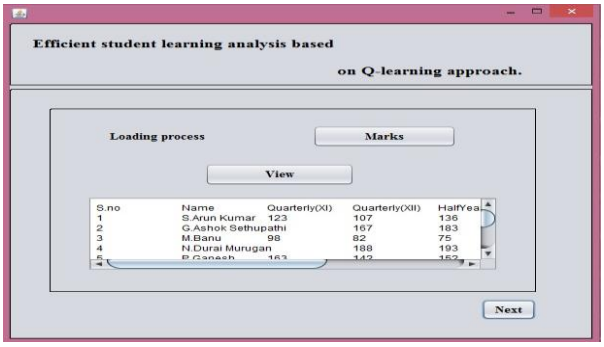

Fig I. Retrieving the Student Mark Details From Database

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)

International Conference on Recent Trends in Computing and Communication (ICRTCC 2015)

Cochin College of Engineering & Technology

Vol. 4, Special Issue 1, June 2015

In this figure is designed using net beans tool. Here using these tools to provide the GUI for our processing and placed on the buttons, labels, panel, frame, text area etc. Use this GUI to load the student marks into our process. Student marks is the input of our process and collect the complete details about the students like S.No, name, marks etc. After identifying the marks of each and every student and analyse the lacking subjects of each and every students. Here collect the student lacking subjects as thermodynamics, gravitation, units and measurements. After analysing the results of each student and show the information Student no, student name, marks, thermodynamics status, gravitation status, units and measurement status.

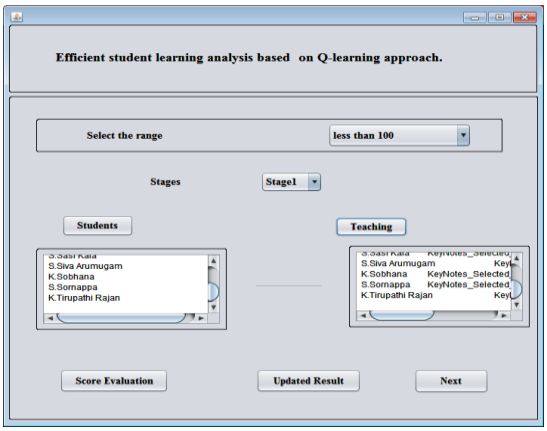

Fig II. Categorized the Students Based On Their Range Of Marks

In this figure is designed using net beans tool. Using this tool is providing the GUI for our processing and placed the buttons, labels, panel, frame, text area etc. Use this GUI to load the student marks into our process. In our process the input is the student marks and Student Marks are categorized first. After that, based on the categorization and retrieve the student name from the database. After collecting the information, and execute the q-learning algorithm to provide the best type of teaching based on the marks. This process takes place in first stage. To evaluate the scores after teaching prediction, evaluate the scores after that teaching. Likewise we perform this process up to five stages. To evaluate the score here we also use q-learning algorithm. The number of students based on their range of marks and analyses the way of teaching for those categories of students by using Q-learning approach. Assign the binary value for observe student willingness in those chapters.

In this figure is designed using net beans tool. Using these tools to provide the GUI for our processing and placed the buttons, labels, panel, frame, text area etc. Use this GUI to load the student marks into our process. After the implementation of Q-learning algorithm and evaluate the new results for the each and every student. New result is nothing but improved results of students after teaching. To differentiate the analysis, show the results of the students before teaching, and results of the students after teaching. This process takes place up to five stages. Finally it shows the last improved results of the students.

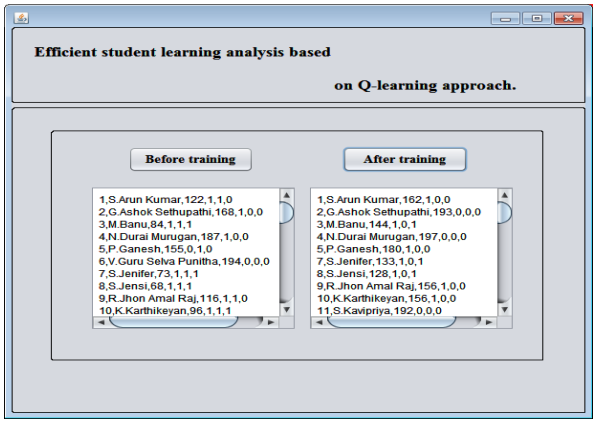

Fig III. Comparison Between Before Training And After Training of Q Learning Approach

V. Conclusion

In our process, are used the cognitive style type teaching. The Interest of teachers and students in the learning process using cognitive-based learning cycle showed a positive response on improving student learning outcomes. In this paper cognitive styles have significant influence on students' academic performance in cognitive-based learning cycle is very effective in improving student learning outcomes, both conceptual understanding and problem-solving skills in physics. The use of this device is very helpful teachers in implementing the learning process because in the lesson plan and syllabus as described teachers handle every steps of the learning process and the targets to be achieved. Likewise, students are helped in meeting the needs of the student book as a learning material. There is still a miss match of teachers and low teachers' ability to use the lab an obstacle in the application of this product. It has also spotlighted that students' academic performance in physics is a function of their attitude. The findings underscore the need for application of cognitive styles by students' for proper understanding of chemistry and that all negative views about the subject should be jettisoned. In the main students with analytic cognitive style have a higher academic performance than student inferential and marks.

References

[1] Akinmade, C. T. (1987). The Swing Away from Science. The Nigerian Chapter. Journal of the Science Teachers' Association of Nigeria, 24 (122), 126-129.

[2] Asuzu, C. U. (1984). Problem solving in Science and Cognitive Categorization Styles. Unpublished M.Ed Thesis, University of Ibadan.

[3] Asuzu, R. U. & Onwu, G. O. (1989). Pupils' Scientific Thinking and Conceptual Categorization Styles. Journal of Education Studies. 1(1), 15-24.

[4] Vijaykuar S, Saravanakumar S.G., "Implementation of NOSQL for robotics", Publisher: IEEE (Dec.2010).. DOI=10.1109/INTERACT.2010.5706225.

[5] Vijay Kumar S, Saravanakumar S.G., Future Roboticcs Memory ManagementFuture Robotics Memory Management, Publisher : Springer Berlin Heidelberg.Year 2011. DOI=10.1007/978-3-642-24055-3_32.

[6] Vijay Kumar, S., K.S. Rajkarthick and J.Priya. "Innovative Business Opportunities and Smart Business Management Techniques from Green Cloud TPS." IJABIM 3.4 (2012): 62-72. Web. 30 Apr. 2015. Doi:10.4018/jabim.2012100107

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE)

International Conference on Recent Trends in Computing and Communication (ICRTCC 2015)

Cochin College of Engineering & Technology

Vol. 4, Special Issue 1, June 2015

[7] Jong, N. K. and Stone, P. (2007). Model-based exploration in continuous state spaces. In Miguel, I. and Ruml, W., editors, 7th International Symposium on Abstraction, Reformulation, and Approximation (SARA 2007), volume 4612 of Lecture Notes in Computer Science, pages 258–272, Whistler, Canada. Springer.

[8] Exploration in metric state spaces. In Fawcett, T. and Mishra, N., editors, Proceedings of the 20th International Conference on Machine Learning (ICML 2003), pages 306–312.

[9] Babalola, O. A. (1989). Relationship between school certificate. Pupils' cognitive preferences and their achievement in Biology. Journal of Science Teachers Association of Nigeria. 16(2), 26-32.

[10] Messixk, A. P. (1996). Cognitive Preference and Academic Achievement to Tenth Grade Physics Students. India Educational Review. 22, 29-37.Electronic Publication: Digital Object Identifiers (DOIs):

[11] Relationalreinforcementlearning: An overview. In Proc. Workshop on Relational Reinforcement Learning at ICML '04, available on-line from http://eecs.oregonstate. edu/research/rrl/. Tsitsiklis, J. N., and Roy, B. V. 1996.

[12] Emina, F. I. (1986). The Development of an Inventory of Scientific Attitude. Journal of Science Association of Nigeria. 24(1&2) 177-187.

[13] Review. 22, 29-37. Morine, N. O. (1992). Relationships between Attitude and Achievement among College Biology Students. Journal of Research in Science Teaching. 19 (16), 78-85.

[14] Pitcher, R. T (2002). Cognitive Learning Styles: A Review of the Field Dependent- Field Independent Approach. Journal of Vocational Education and Training. 54 (1), 177-132.

[15] Riding, R; Glass, A & Dauglas, G. (1993). Individual Differences in Thinking: Cognitive and Neuropsychological Perspective. Educational Psychology. 13 (3&4), 267-279.

[16] Individual Differences in Cognitive Styles and the Guidance Variables in Instruction. Journal of Experimental Education, 45 (4).

[17] Stephen, U. (2002). Cognitive Styles and Students' Problem-solving Competence in Physics. Unpublished Doctoral Thesis. University of Uyo. Thronel, J. G. (1994).