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PREDICTION OF STUDENT OUTCOME IN EDUCATIONAL SECTOR BY USING DECISION TREE

M.Pavani[1], A.Ravi Teja[2], A.Neelima[3], G.Bhavishya[4], D.Sai Sukrutha[5]

Abstract: Data Mining is defined as extracting information from massive sets of data. We can say that data mining is the procedure of mining knowledge from data. Classification is a data mining function that assigns items in a collection to target categories or classes, coming to prediction attempts to form patterns that permit it to predict the next event's given the available input data. Now-a-day's Educational data mining is an emerging discipline. Educational Data Mining field concentrates on Prediction more often as compared to generate exact results for future purpose. Observing the changes occurring in the schedule of day-to-day inquiry. Though it is the biggest educational challenge to improve the condition of student's performance. This title mainly focuses on identifying the student's outcome by using decision tree based classification algorithms. The data set of student academic records is tested and applied various decision tree based classification algorithms such as C4.5. The outcome of statistics is generated based on decision tree based classification algorithms, and comparison of two classifiers is also done to predict the accuracy. This project promotes the importance of prediction and decision tree classification based data mining algorithms in the field of education and also presents some promising future lines.

Key Words: Educational Data Mining, Classification, Prediction, C4.5.

I. INTRODUCTION

Nowadays Educational Data Mining is an emerging discipline. Educational Data Mining describes a research field concentrated with the application of data mining, machine learning, and statistics Educational Data Mining field mainly focuses on prediction more often as compared to produce exact results for future purpose to information generated from educational settings. Educational Data Mining refers to techniques, tools, and research designed for automatically extracting meaning from large repositories of data generated by or related to people's learning activities in educational settings. Quite often, this data is extensive, fine-grained, and precise. For example, several learning management systems (LMSs) track information such as when each student accessed each learning object, how many times they accessed it, and how many minutes the learning object was displayed on the user's computer screen. Educational Data Mining (EDM) describes a research field concerned with the application of data mining, machine learning and statistics to information generated from educational settings.

II. LITERATURE REVIEW

Data mining in higher education is a recent research field and this area of research is gaining popularity because of its potentials to educational institutes. Data Mining can be used in educational field to enhance our understanding of learning process to focus on identifying, extracting and evaluating variables related to the learning process of student. Mining in educational environment is called Educational Data Mining. Educational data mining is emerging as a research area with a suite of computational and psychological methods and research approaches for understanding how students learn [1]. Data Mining or Knowledge Discovery is needed to make sense and use of data. Knowledge Discovery in Data is the non-trivial process of identifying valid, novel, potentially useful and ultimately understandable patterns in data [2]. [3] The paper depicts the users, components as well as the various approaches in EDM. Educational data mining (EDM) is concerned with developing methods for exploring data from educational settings with the purpose of providing quality education to students [6]. Another study of predicting the performance of students on educational web based system was done in [4] in which data mining techniques were applied on the vast amount of data on user patterns collected during the interaction of students with the web based education system. The approach followed is to analyze the logged data of students and then classify students based on the data and predict the final grade of the students, the authors have used multiple classifiers and applied genetic algorithm to improve the accuracy of the prediction. In this paper a strategy to improve the student's performance is mentioned by mapping the student's record using classification algorithm and grouping datasets into cluster but there is no future performance prediction. Applied the classification as data mining technique to evaluate student" performance, they used decision tree method for classification. This study helps earlier in identifying the dropouts and students who need special attention and allow the teacher to provide appropriate advising [5]. The reference provides a methodology for Improving Quality of Educational Process by using classification, c4.5 algorithm on the other part decision making process for enhancing the quality of educational activities is mentioned.[7]The paper provide a prediction of Applying data mining technique to identify whether students' online learning experiences can be assessed based on their log files but It is limited to the available data in online database while factors such as students' position in the collaborative group and Structure of the collaborative tasks is not considered. [8] Applied the classification as data mining technique to evaluate student" performance, they used decision tree method for classification. This study allows the University management to prepare necessary resources for the new enrolled students and indicates at an early stage which type of students will

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potentially be enrolled and what areas to concentrate upon in higher education systems for support.

III. PROPOSED WORK

Educational data mining has vast amount of data that has to be organized in a consistent manner .To organize, analyze and classify students details in classification algorithm we are using c4.5 algorithm is been used based on academic records. Our Architecture of proposed work is as follows.

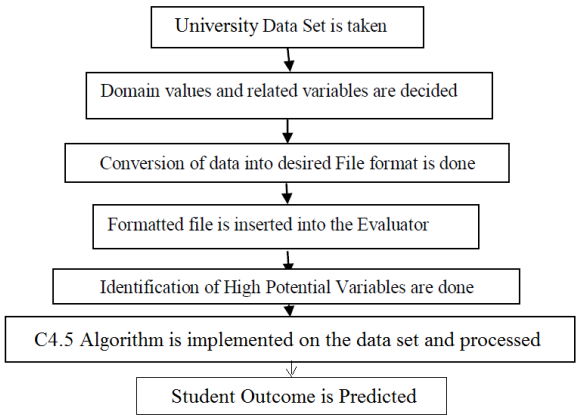

Fig 1. Flowchart of proposed work

But it simply specifies the current scenarios whereas no future prediction is available and variables used for analysis are only based on demographic and academic records. Therefore to enhance the existing system the proposed model is designed by collecting Students Personal and Academic data from the senior students of the institution and Thereby Grouping the student's performance based on certain conditions as

- Poor
- Good
- average

Classification consists of predicting a certain outcome based on a given input. In order to predict the outcome, the algorithm processes a training set containing a set of attributes and the respective outcome, usually called goal or prediction attribute. There is a work methodology which governs a series of stages. The methodology starts from the problem definition, then data collection from questionnaire and Students Database. The analysis of c4.5 algorithm is done to predict student's performance by creation of student model.

C4.5 is a computer program for inducing classification rules in the form of decision trees from a set of given instances C4.5 is a software extension of the basic ID3 algorithm designed by Quinlan.

C4.5 builds decision trees from a set of training data in the same way as ID3, using the concept of information entropy. The training data is set S= s1,s2……. of already classified samples. Each sample x_i consists of a{\displaystyle S={s_{1},s_{2},...}} {\displaystyle s_{i}} p-dimensional vector (x1,i,x2,i,….xp,i),{\displaystyle (x_{1,i},x_{2,i},...,x_{p,i})} where the x_i{\displaystyle x_{j}} represent attribute values or features of the sample, as well as the class in which s_i {\displaystyle s_{i}}falls.

At each node of the tree, C4.5 chooses the attribute of the data that most effectively splits its set of samples into subsets enriched in one class or the other. The splitting criterion is the normalized information gain (difference in entropy). The attribute with the highest normalized information gain is chosen to make the decision. The C4.5 algorithm then recurs on the smaller sub lists.[8]

Entropy

In general, if we are given a probability distribution P = (p1,p2,……,pn) and a sample S then the Information carried by this distribution, also called the entropy of P is giving by:

$$\text{Entropy } (p) = \sum_{i=1}^{n} pi \times \log(p)$$

The gain information G (p, T)

We have functions that allow us to measure the degree of mixing of classes for all sample and therefore any position of the tree in construction. It remains to define a function to select the test that must label the current node.

It defines the gain for a test T and a position p

$$\text{Gain (p, T)} = entropy(p) - \sum_{j=1}^{n}(pi \times entropy(pj)$$

Where values (pj) is the set of all possible values for attribute T. We can use this measure to rank attributes and build the decision tree where at each node is located the where values (pj) is the set of all possible values for attribute T . We can use this measure to rank attributes and build the decision tree where at each node is located the attribute with the highest information gain among the attributes not yet considered in the path from the root. A survey cum experimental methodology is used. Through extensive search of the literature and discussion with experts on student performance, a number of factors that are considered to have influence on the performance of a student are identified. These influencing factors are categorized as input variables. For this work, recent real world data is collected from college. This data is then filtered out using manual techniques. Then student data is finding accurately by using c4.5 algorithm.

This algorithm has few base cases to be checked

1. All the samples in the list belong to the same class. When this happens, it simply creates a leaf node for decision tree that saying to choose to that class.
2. None of the features provide any information gain. In this case, C4.5 creates a decision node higher up the tree using the expected value of the class.
3. Instance of previously-unseen encountered. Again, C4.5 creates a decision node higher up the tree using the expected value.

The pseudo code for c4.5 algorithm is as follows:-

1. Check for the above base cases.
2. For each attribute a, find the normalized information gain ratio from splitting on a.
3. Let a_best be the attribute with the highest normalized information gain.

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4. Create a decision node that splits on a_best.
5. Recur on the sublists obtained by splitting on a_best, and add those nodes as children of node.

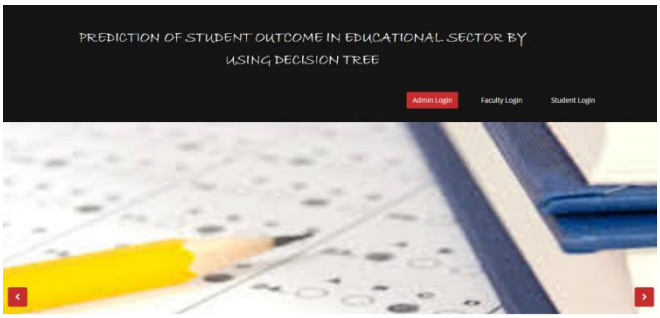
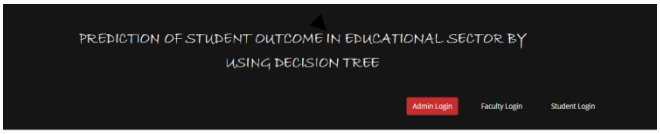


Fig 2 . Home Page of System



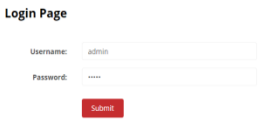


Fig 3. Login Page for Administrator

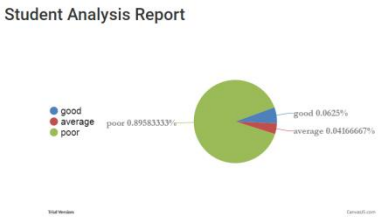


Fig 4. Student Report is represented in pie chart

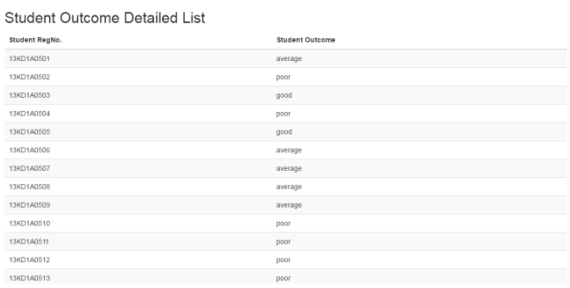


Fig 5. Each Student Outcome is displayed

IV. CONCLUSION

In this paper, c4.5 algorithm is used to predict the student outcome on the dataset of 250 students. These data sets are used to predict the student outcome (good or average or poor).In this study, a model was developed based on selected students related attributes collected from university data set. By using our model faculty can analyze the student performance as well as student also can view his/her outcome. Educators who don't have technical knowledge can also understand student performance. New factors like No of projects, No of Papers Published , No of certifications, No of conferences also plays a key role during calculation of student performance.

REFERENCES

[1] Jiawei Han , Micheline Kamber , Jian pai , "Data Mining: Concepts and Techniques" , Third Edition (The Morgan Kaufmann Series In Data Management Systems) 3rd Edition.

[2] Fayyad, PlatetSky- Shapiro, Smyth and Uthrusamy, "AdvancesIn Knowledge Discovery and Data Mining" , AAAI/MIT Press1996.

[3] Crist'Obal Romero Member, IEEE and Sebestian Ventura Senior Member IEEE, "Educational Data Mining: A Review Of the State of the Art" Vol 40, No 6, November 2010.

[4] Predictiong Student Performance: An Application of Data Mining Methods With an Educational Web-Based System Behrouz Minaei-Bidgoli, Deborah A. Kashy, Gerd Kortmeyer William. Punch, 2003 IEEE, 33'D ASEE/IEEE Frontiers in Education Conference.

[5] AL-Radaideh, Q, AL-Shawakfa, E And Al-Najiar M (2006) ,, Mining Student Data using Decision Trees", The 2006 International Arab Conference on Information Technolgoy (ACIT2006) – Conference Proceedings.

[6] B . K. Baradwaj And S. Pal, " Mining Educational Data To Analyze Students Performance", Int JAdv Comput Sci. Appl., Vol 2, No 6, PP 63-69,2011.

[7] Baradwaj, B And Pal, S. (2011) ,, Mining Educational Data To Analyze Student S'' Performance", International Journal of Advanced Computer Science and Applications, Vol 2, No 6,PP-63-69.

[8] C4.5 algorithm in Wikipedia

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