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Student – Teacher Performance Prediction using Machine Learning

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ABSTRACT

Student performance is one of the crucial and necessary part in the educational system due to its large volumes of real-time data that cannot be analyzed manually by the humans. So, here comes machine learning that is used to easily predict the performance of the students. This job is being performed by educational data mining (EDM). EDM contains the methods that are used to discover the data in the educational environment and are used for understanding the student and their learning environment. The educational institutions are responsible and also at the same time curious to know about the performance of the students and teachers to know the current status of the functioning of the institution towards a better path.

In this project, 3 models namely students assessments grades, final student performance, teachers performance. The result shows that both all the models will be showing an accurate result. A system is designed to predict the performance of the teachers based on the average of the grades of all the students, Students review and the staff members review are taken as input and the performance of the teachers is predicted accordingly. And at the same time, we will also be predicting the performance of the students based on their previous academic performance and gives suggestions.

1. Introduction

All educational institutions are currently concentrating on enhancing student learning abilities in order to increase the quality of teaching. According to the studies, we may utilize university data as a gauge to assess how well the institution is performing by looking at its student data. One benefit of analyzing student performance is that it can help the university determine whether changes to its curriculum are necessary to better support students in the workforce.

In order to make the appropriate arrangements, educational institutions frequently wonder how many students will pass or fail. It has been noted in earlier studies that many researchers focus on choosing the best algorithm for only classification and neglect to find solutions to issues that arise during the data mining phases, such as data high dimensionality, class imbalance, and classification mistake, among others. These kinds of issues made the model less accurate.

2. Machine Learning

Artificial intelligence (AI) has a subfield called machine learning (ML), which enables computers to "self-learn" from training data and advance over time without being explicitly programmed. In order to generate their own predictions, machine learning algorithms can recognize patterns in the data and learn from them. In summary, algorithms and models that use machine learning learn from experience. In conventional programming, a computer engineer creates a set of instructions for a computer to follow in order to convert input data into a desired output. The majority of instructions follow an IF-THEN structure, where a certain action is carried out by the program only under certain circumstances.

Contrarily, machine learning is a process that is automated and gives computers the ability to solve issues with little to no human involvement and take appropriate action. Machine learning, is an automated process that helps machines to solve problems with little or no human input, and take actions based on past observations. Massive amounts of data can be used to put machine learning to work, and it is much more accurate than humans. It can assist you in saving time and money on tasks and analyses, such as reducing customer frustration to increase customer satisfaction, automating support ticket processing, and data mining from internal sources and across the internet.

Existing solution

The existing systems that have been surveyed concentrated on predicting only the performance of the students based on their academic marks, their attendance and various extra-curricular activities of the students. There are few more existing systems where the performance of the students is predicted based on their personal background i.e the parents qualification. But, predicting the performance alone cannot solve the issue of improving the student's

performance. It requires something that has to be done to enhance the idea of improving the performance of the students. When it comes to teacher performance, the performance of the teachers are predicted based on the student and the colleagues feedback and the experience of the teachers. But, it is not a proper outcome of the performance with the help of the reviews. There must be something that must be done to enhance the performance.

Limitations of Existing Solution

In existing systems, the prediction is done but there is no solution for the issues faced to improve the performance of the students.

The predicted results of students were found to be less accurate when considering academic year wise.

Proposed Solution

The proposed system makes sure that the students not only gets the predicted outcome, but also the suggestions based on the outcome of prediction. The suggestions will be given by telling the students to do various assignments for the activities that they are having the chances to fail. These suggestions not only gives the predictions, but also provides the solution or the DO's to enhance their performance. In the teacher's performance prediction, the teacher's performance will be identified by not only the feedbacks given by the students and the colleagues, but also the comparison is done for the average marks of the students in their previous academic scores and the current academic scores.

3. Literature Review

The major objective of this study is to create a data mining model that assesses and forecasts student and instructor performance. We will do this by using actual data sets to test our methodology. Predicting student performance has gotten harder as a result of the vast amount of data in educational databases. The lack of a developed system for assessing and monitoring student success is also not being taken into account. There are primarily two causes for this type of situation. First of all, there is still inadequate study on the various prediction techniques to choose the ones that will best forecast students' success in academic settings. The second is the lack of investigation into the particular courses.

SURVEY	AUTHOR	ALGORITHM	ADVANTAGE	DIS- ADVANTAGE
Student's Performance Prediction Using Deep Neural Network	Bendangnuk sung and Dr.Prabu P	Naïve Bayesian, ANN and Decision tree	1.The model achieved upto 23.1% and increased upto 25.8% accuracy.	1. It has features with less difference in the information gain. 2. There is a possibility of slipping away other Important and necessary features when one condition fails.
Preventing Student Dropout in Distance Learning Using Machine Learning Techniques	S.B. Kotsiantis,C.J. Pierrakeas, and P.E. Pintelas	Naïve Bayesian, SVM, Logistic regression and Decision tree	1.The accuracy reaches 65% in the initial predictions based only on demographic data of the students and exceeds 86% before the mid of the academic period.	1.collecting student data is often expensive and time taking and the classifier becomes more Complicated too.
Prediction of University Student Performance Based on Tracer Study Dataset Using Artificial Neural Network	Zahrina Aulia Adriani	ANN	1.The model accuracy Increased by 20%	1. Need to add more features that related with the student performance.

Predicting Students' Performance Using Machine Learning Techniques	Hussein Altabrawee, Osama Abdul Jaleel Ali , Samir Qaisar Ajmi.	Naïve Bayesian, ANN, Decision tree and logistic regression.	1.ANN model has the highest ROC index that equals to 0.809 and Accuracy of 77.04	1. The decision tree model showed that not all the attributes are involved in the classification process

SURVEY	**AUTHOR**	**ALGORITHM**	**ADVANTAGE**	**DIS - ADVANTAGE**
Educational Data Mining & Students' Performance Prediction	Amjad AbuSaa	Decision tree, Naïve Bayes	1.Multiple data mining tasks were used to create qualitative predictive models which were effectively able to predict the students' grades .	1. It was slightly found that the student's performance is not fully dependent on their academic efforts, but there are many other factors that have equal to greater influences as well.
Analyzing undergraduate students' performance using educational data mining	Raheela Asif	Decision tree, Random forest	1. This would have an accuracy of 52.92%	1. It concerns predicting students' performance using marks only, but there is no socio-economic data.
Students Performance Prediction in Online Courses Using Machine Learning Algorithms	G Mallikharjuna Rao, Prof. K. Kiran Kumar	DNN	1.The proposed model achieved an accuracy of 85.3%	1.The model is not tested on offline mode. The performance might also be decreased in offline mode using time dependent attributes.
Artificial Neural Network with 3 layer perceptron to predict student academic performance based on learning style	Hoang Tieu Binh ,Bui The Duy	ANN, BPNN	1.They achieved 81.63 % of accuracy rate using multilayer perceptron in this project.	1.The results proved that PNN approach can make classification more stable and have highest precision and it reduce the iterative amount easily.

SURVEY	**AUTHOR**	**ALGORITHM**	**ADVANTAGE**	**DIS - ADVANTAGE**
Improving teacher performance using data mining	Randa Kh. Hemaid	Association, classification model.DT, rule Induction, K-NN, NB (kernel).	1.K-NN classifier 79.95% accuracy K=6. 2.Contributes most to the performance of teachers.	. Focuses on teachers' Performance only. . Doesn't provide any suggestions.
Predicting instructor performance using data mining techniques in higher education	Alaa M. ElHalees	Classificatio n model (C6.0, SVM, ANN, DA)	1.Student evaluation questioner with 28 attributes.	1.Student evaluation Uses only course questioner evaluation to evaluate by the student. 2.Students have

				lack of maturity here.
Teachers' performance evaluation in higher educational institution using data mining technique	Asanbe M.O. & William W.F.	Classification model. Artificial neural network, decision tree. Wekamachine learning tool.	1.Working experience and rank is most contributed. 2.The c4.6 best accuracy of 84.5%.	1.Doesn't provide any suggestions to increase theteacher's performance**.**
Data mining in teacher evaluation system using weka IJCA	Fateh Ahmadi	Decision tree model with a J48tree. 105 records 6 attributes.	1.Evaluation score of students is a very Crucial factor.	1.Only use one Algorithm in the model. Low dataset and attribute.

4. Conclusion

In order to increase student performance on the final exam, instructors could fine-tune their delivery methods with the aid of an early assessment of students' attention. The major objective of this paper is to create a data mining model that assesses and forecasts student and instructor performance. We will do this by using actual data sets to test our methodology. A artificial neural network model along with some machine learning algorithms is proposed in this paper for predicting the students' and teachers performance.

Through the experiment we found that a ANN can perform better even with less amount of data by having deep knowledge about dataset and quality tweak on the model.

The proposed model is expected to achieve an accuracy of 95%. With larger dataset records and features, ANN can achieve higher accuracy and will outperform other machine learning algorithm.

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