

Analysis of Student Performance Prediction using Deep Learning: A Brief Survey

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ABSTRACT

Nowadays, the educational system has been gradually transferring into a digital format like other fields, which leads to the growth of various trends like Virtual learning environment as well as E-Learning. These trends further spread the knowledge all over the world which results in no need for educational institutions' services for learning. By gathering information about the student from the student's success Data Set, the primary objective of this study is to forecast the student's academic success. In the proposed method, the activation ensemble is included, which leads to the self-converged classifier, since it allows the numerous activation functions at every layer of the classifier, and compares the input value with the threshold value for establishing the proposed model. The model receives the output of the suggested system and uses it to forecast the student's performance by comparing the input data with the test data.

I. INTRODUCTION

Like all other industries where people work, education has recently undergone digital upheaval. Massive Open Online Courses (MOOCs) and virtual learning environments (VLEs) are only two trends that have emerged as a result of the usage of new technology in education.

The services that educational institutions provide are always being improved; they attempt to have the best teaching staff, elevate the standard of instruction, and raise the academic achievement of their pupils. Universities and study centres may be able to better cater their curriculum and teaching techniques to the requirements of their students if they are aware of the elements that influence student learning. The development of Virtual Learning Environments (VLEs) was one of the earliest strategies used by educational institutions. Because this kind of setting allows students to study from anywhere in the globe, it is feasible to draw in more students because their geographic location is no longer a barrier. Additionally, VLEs make it simpler to monitor the activities of the teaching staff and the relationships between students and teachers, as well as to access educational resources. Online settings therefore allow for the assessment of the variables that influence changes in students' academic performance.

II. LITERATURE REVIEW

Adel, Abdulaziz, and others [2] More and more educational activities are managed, tracked, and reported using learning management systems (LMSs). Blackboard is one such extensively utilised LMS in global higher education institutions. This is because it has the ability to match assessment activities, student-student, and student-teacher interactions, with predetermined goals and student learning outcomes. This study sought to ascertain the role that specific Key Performance Indicators (KPIs) based on student Blackboard interactions played in predicting students' learning outcomes. In a mixed-methods study, four deep learning

models for forecasting student performance were examined. Reports on seven general preparatory courses were used to gather data. To determine potential predictive KPIs linked to the electronic Blackboard report, they were examined utilising a documentary analysis methodology. To determine the degree to which these variables are linearly connected with student performance measures, correlational studies were carried out. The best technique among the four models evaluated, according to the results, was a predictive model that integrated convolutional neural networks with short-term memory (CNN-LSTM). The key inference made from this research is that the combined CNN-LSTM strategy may result in interventions that enhance and increase the use of the Blackboard LMS in academic settings.

P.K. Gupta, Prakhar Bhardwaj, and others [3] Digital learning and e-classes have become increasingly common in the educational sector as a result of the COVID-19 epidemic. It will be difficult for teachers and students to uphold the same learning standards. In this study, we attempted to provide digital learning platforms some credibility while still supporting the educational system. We employed face expression recognition in conjunction with deep learning-based approaches to assess the amount of student engagement. In live online classrooms, the student's MES is determined using a variety of weights that were obtained using the methods that were just discussed.

Hiba Al Sghaier, Mohammed Akour, and others [4] Research on educational data mining is becoming increasingly essential as it helps to reveal relevant information from educational data sets that can be used for a variety of reasons, including forecasting students' academic success. As a response to the present educational systems, predicting student accomplishment may be helpful in creating and implementing a number of improvements in the educational environments. The majority of recent studies have employed machine learning to forecast kids' academic success using a variety of factors, including family income,

student gender, amount of absenteeism, and other factors. In order to determine whether or not students will be able to complete their degrees, examining how well the CNN deep learning system predicts students' performance may be helpful. The experimental findings show that the suggested model performed better in terms of prediction accuracy than the current methods.

Pablo Moreno Ger, Angel Casado Hidalgo, and others [6] In recent years, the study of educational data science has contributed significantly to the understanding and development of learning models. Predicting student success using click-stream data in virtual learning environments, which offers a wealth of information about their conduct during the course, is one of the most pertinent study issues. In order to provide a foundation for further research, this paper examines the possibilities of Deep Learning and Meta-Learning in this area, which has received relatively little prior research. Predicting student success using click-stream data in virtual learning environments, which offers a wealth of information about their conduct during the course, is one of the most pertinent study issues. In order to provide a foundation for further research, this paper examines the possibilities of Deep Learning and Meta-Learning in this area, which has received relatively little prior research. The outcomes demonstrate that the autonomous model's performance was comparable to that of the conventionally constructed one, which provides important advantages in terms of efficiency and scalability. This also offers up intriguing avenues for meta-learning research using big data in education.

Adnan, Emel Khan, as well as others [8] In this work, we proposed the XAI model as a tool for teachers to assess online students' study habits. This study's main objective was to make ML models simpler in a way that humans could understand. Therefore, instructors may comprehend how a certain student was placed in a particular class and how the ML model arrived at specific findings. Therefore, instructors may comprehend how a certain student was placed in a particular class and how the ML model arrived at specific findings. The RF model fared best among the ensemble ML models, whereas the logistic regression model performed best among the traditional ML models, according to the performance statistics for the ML models.

| Authors | Methods | Research Outcome | Limitation |
|------------------------------|--------------------------------|------------------------------|----------------------------------|
| Alberto Rivas et.al., [1] | Tree-based methods and ANN | Improved performance rate | Required a large amount of data. |
| Prakhar Bhardwaj et.al., [3] | Deep learning-based algorithms | Improved student assessment. | Large training period. |
| Authors | Methods | Research Outcome | Limitation |

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| Kwok Tai Chui et.al., [12] | Improved conditional generative the adversarial network-based deep support vector machine (ICGAN-DSVM) algorithm and kernel design. | High accuracy and efficiency. | Shallow learning and big-sized datasets. |
| Dong Liu et.al., [11] | Machine learning and RNN-based fusion attention mechanism. | High accuracy. | The developed mechanism is hard to train. |
| Ahmed A. Mubarak et.al., [13] | CNN and LSTM | Dropout prediction is improved and has high accuracy. | Prediction by time steps is not consistent. |
| Sri Suning Kusumawar dani et.al., [14] | LMS and LSTM | Improved accuracy rate. | Lack of training memory. |

III. PROPOSED SYSTEM

The primary goal of this study is to forecast a student's academic success by gathering information about the student from the student success Data Set [16], and e-Khool dataset, which includes log file, course id, title id, lecture type, time period, exam score, profile, course complexity, study form, portion covered, mark scored, as well as type of utilized material. Then, the collected data is fed forward to the phase of feature extraction, which extracts the different features. The output of the proposed system is passed to the model, which compares the input data with the test data to predict the performance of the pupil.

IV. CONCLUSIONS

The route means square error as well as mean absolute error of the RNN-based fusion attention mechanism in for the prediction of student's performance is attained by 0.26% and 0.20%, which has been further reduced through the proposed Deep RNN classifiers in terms of their performance metrics such as MSE, Route MSE, and MAE.

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