iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** IV **Month of publication:** April 2024

DOI: https://doi.org/10.22214/ijraset.2024.59873

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue IV Apr 2024- Available at www.ijraset.com

Comparative Analysis of ML Algorithms and Neural Networks to Classify Student Based on Academic Performance

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Abstract: ***In recent years, there has been an interesting surge in interest in both educational data and deep learning. This research proposes a Neural Network (NN) architecture that visually represents the class category to students. This gives information to the school so they can help the pupils who might otherwise fail. A comparative analysis between the suggested model and present-day techniques of machine learning that utilizes the identical dataset. Compared to existing machine learning algorithms, the accuracy of the suggested neural network model is higher.***
Keywords: Neural Network, Machine Learning, Algorithms, Student Performance Classification

I. INTRODUCTION

A student's career or the reputation of the institution have always been greatly influenced by their academic performance. A subject called education data mine (EDM) is used to take relevant knowledge out of an educational setting. Applications of EDM, such model construction, aid in the prediction of students' academic success. In an effort to enhance current techniques, researchers have thus far dug deeply into a variety of data mining techniques. The use of machine learning techniques to forecast student success based on academic history and term exam results has been beneficial in predicting varying levels of performance. By employing these machine learning techniques, educators may promptly identify pupils who are at risk of failing and give them remedial instruction. It may even be useful in identifying the institution's top pupils and in assisting him with scholarships. Educational data mining makes extensive use of machine learning algorithms like Naive Bayes [9] and Decision Tree [10]. According to Havan Agrawal [1], there is a drawback to these algorithms: the models' accuracy decreases when input is given in a continuous range for Bayesian classification. Discrete data is more conducive to this type of classification. Furthermore, mentioned is the reality that a neural network works better with continuous data. In terms of research on artificial intelligence, deep learning , deep learning is regarded as the cutting edge [5] technique with a multitude of applications. There are four categories of deep learning: Q-learning, Convolutional Neural Network (CNN), Recurrent Neural Network (RNN), and Deep Neural Network (DNN). Recently, deep learning has been adopted to computer vision [6], natural language processing [8], and voice/sound recognition [7]. To forecast the performance of the students, we suggested a Neural Network (DNN) classifier model in this research. The suggested NN model uses logistic classification analysis to forecast students' placement in the pass or fail categories. The suggested algorithm has a predicted 85% accuracy rate in predicting students who will fail.

II. EXISTING SYSTEMS

1) Grit Net: Student Performance Prediction with Deep Learning

The difficult topic of Determining Performance involves having a machine determines how well pupils will succeed in the future as they engage with online education. Timing instructional interventions during course may depend on accurate early-stage projections of a student's performance in the future. Very few earlier research, meanwhile, have looked at this issue from a deep learning standpoint. In this work, we reframe the difficulty in forecasting student performance as a sequential event prediction problem and provide a novel deep learning-based system called Grit Net that extends the capabilities of the bidirectional long short-term memory (BLSTM). Based on actual graduation predictions made by Udacity students, our findings demonstrate that the Grit Net regularly performs better than the usual logistic-regression based method. Furthermore, the benefits are particularly noticeable throughout the initial few weeks, when making accurate forecasts is the most difficult.

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2) Students' Performance Prediction Using Deep Neural Network

The fields of deep learning and educational data mining have received a lot of interest lately. This paper proposes the Deep Neural Network (DNN) model, a neural network that is able to recognize a class category and display that information to students. The institution can use this knowledge to propose a cure for probable failing students. The advised model is evaluated with an currently in place machine learning technique that utilizes the same dataset. The suggested deep neural network model exceeds previous machine learning techniques in accuracy, achieving up to 84.3% accuracy.

3) Predicting students' yearly performance using neural network: A case study of BSMRSTU

The academic background and familial assistance of a student are reflected in their performance in the classroom. The educational institution needs to know this performance record because it contains useful information that will assist them enhance their offerings. Information can be extracted and analysed from these data with the aid of educational data mining. We are able to ascertain the academic performance status of the student. We can make use methods like decision trees, neural networks, support vector machines, data clustering, classification, and so on to accomplish this. Using a neural network, we will forecast students' yearly performance as measured by their Cumulative Grade Point Average (CGPA) in this paper and compare the results to the actual CGPA. A genuine dataset would be crucial in this context.

III. PROPOSED SYSTEM

In past years, Neural Networks had seen widespread and successful implementations in a wide range of data mining applications, often surpassing other classifiers. In this research, we proposed a Neural Networks are a fitting classifier to predict student performance from Learning Management System data in the context of Educational Data Mining.

1) *Upload dataset:* to upload dataset
2) *Pre-processing:* to clean missing values and then convert all dataset non-numeric values to numeric by using DATA TRANSFORMATION. In above dataset for gender, we have values as 'M and F' but machine learning algorithms will not understand non-numeric data so we have converted it into numeric values. After data transformation M will replace with value 0 and F will replace with value 1. For all non-numeric values data transformation will be used to convert to numeric format.
3) *Generate Train & Test Model:* using this module we will split the dataset into train and test records. Application will use 80% data for training and 20% data for testing.
4) *Graph:* In graph x-axis represents algorithm names and y-axis represents accuracy of those algorithms. From the graph we can conclude NN algorithm got highest accuracy.

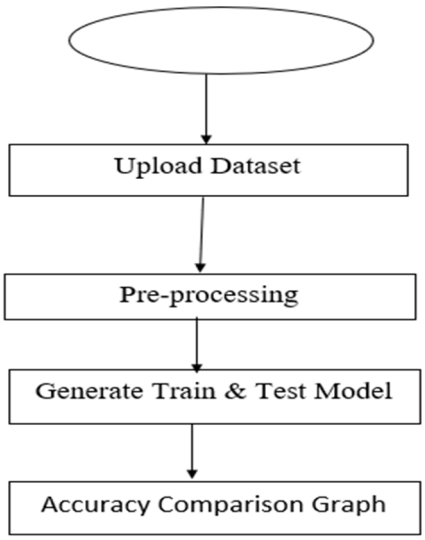

Fig 3.1: Execution flow

Flow chart

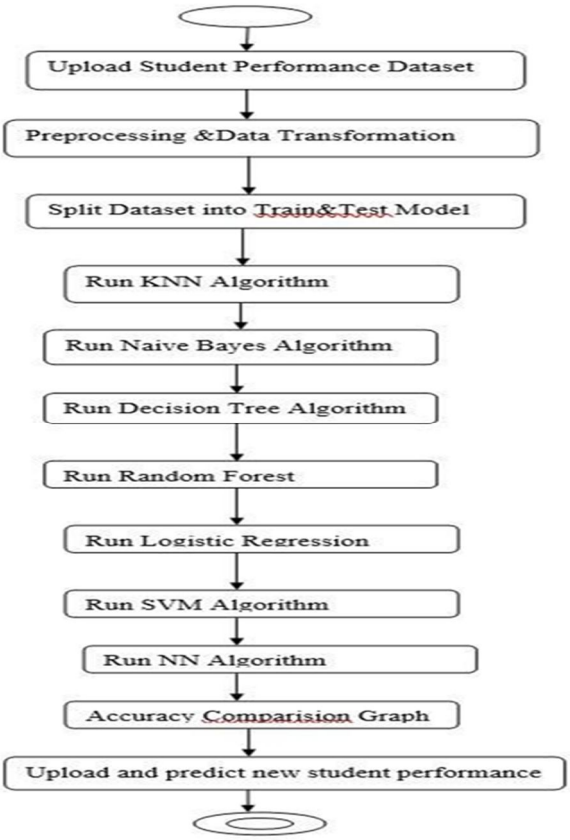

Fig.3.2:work flow

IV. RESULTS AND DISCUSSION

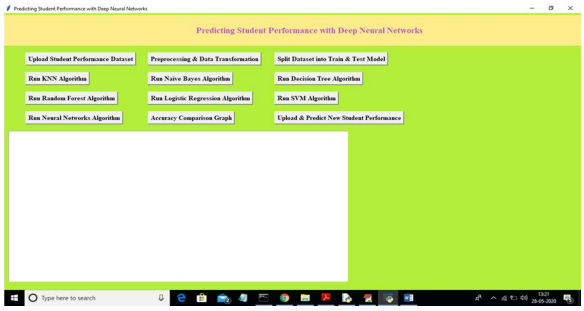

Fig 4.1:GUI

In above screen click on ‘Upload Student Performance Dataset’ button and upload dataset

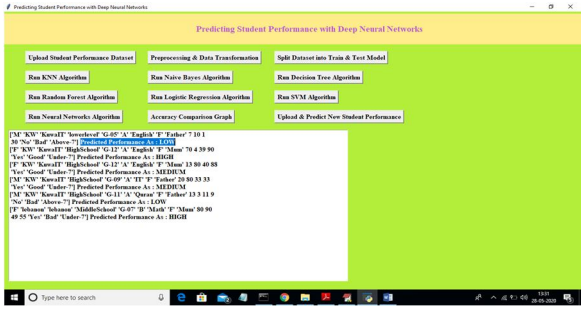

Fig 4.2:Predicted Performance

In above screen for each test dataset records we got predicted performance value as HIGH, LOW or MEDIUM

Algorithm	Accuracy
KNN	61.4
Naïve Bayes	67.7
Decision Tree	64.5
Random Forest	79.1
Logistic Regression	70.2
SVM	56.2
Neural Networks	94.5

Fig 4.3:Accuracy Table

V. CONCLUSION

In this research, we assess the efficiency of different neural networks and machine learning algorithms in predicting student performance. Comparing neural networks to other artificial intelligence algorithms like KNN, Naïve Bayes, support vector machine, Random Forest, Logistic Regression, and Decision Tree, the former exhibits higher prediction accuracy.

REFERENCES

[1] S. Sebastian and J. J. Uchiyama, "Evaluating students' performance by ANN using weak", IJOCA vol. 119, no. 23, pp. 36-39, 2015.
[2] S. K. Yadav, B. Bharadwaj and S. Pal, "Data mining applications: A examination of similarities for predicting student's performance", arrive preprint arXiv:1202.4815, 2012.
[3] M. O. Pedro, R. Baker, A. Bowers and N. Heffernan, "Predicting college enrolment from student interaction with an intelligent tutoring system in middle school", Data Mining in Education 2013, 2013.
[4] A. Vivienne, M. Laukkanen and J. Kur hila, "Using students' programming behaviour to predict success in an introductory mathematics course", Educational Data Mining 2013, 2013.
[5] J. Bayer, H. Budowski, J. Geryk, T. Bosick and L. Peplinski, "Predicting drop-out from social behaviour of students", IEDM Society, 2012.
[6] Y. Bengio, R. Ducharme, and P. Vincent. A neural probabilistic language model. In Neural Information Processing Systems Advances 13 (NIPS 2000), pages 932–938, 2001.
[7] I. Chuang and A. Ho. Harvard and MITx: Four years of open online courses, Fall 2012-Summer 2016. SSRN Electronic Journal, 2016.
[8] Economist. Equipping people to stay ahead of technological change - Lifelong learning. A Special Report on Lifelong Learning: How to Survive in the Age of Automation, 2017.
[9] A. Garaves and J.Scehmid Huber. Identifying phoneme framewise using bidirectional LSTM networks. In 2005 International Joint Conference on Neural Networks (ICJNN'05), pages 23–43, 2005.
[10] J. D. Keeler, D. E. Rumelhart, and W. K. Leow. Integrated segmentation and recognition of hand-printed numerals. (NIPS 1990), pages 557–563, 1991.
[11] F. Mi and D.-Y. Yeung. Temporal models for massively open online course dropout prediction. In Proceedings of 15th (ICDMW 2015), pages 256–263, Atlantic City, New Jersey, 2015.
[12] A. Y. Ng. Feature selection, L1 vs. L2 regularization, and rotational invariance. International Conference on Machine Learning (ICML 2004), pages 78–85, Banff, Alberta, Canada, 2004.
[13] C. Ruudin, B. Leatham, A. Salle-Aouissi, E. Koogan, and D. Maidigan. Forecasting sequential events utilizing association rules. (COLT 2011), pages 615 – 634, 2011.
[14] W. Waang, H. Yuu, and C. Miaoo. Deep model for dropout prediction in moods. (ICCSE 2017), pages 26–32, Beijing, China, 2017.
[15] J. Whitehill, K. Mohan, D. Seaton, Y. Rosen, and D. Tingley. Delving deeper into mooch student dropout prediction arrive preprint arXiv:1702.06404, 2017.

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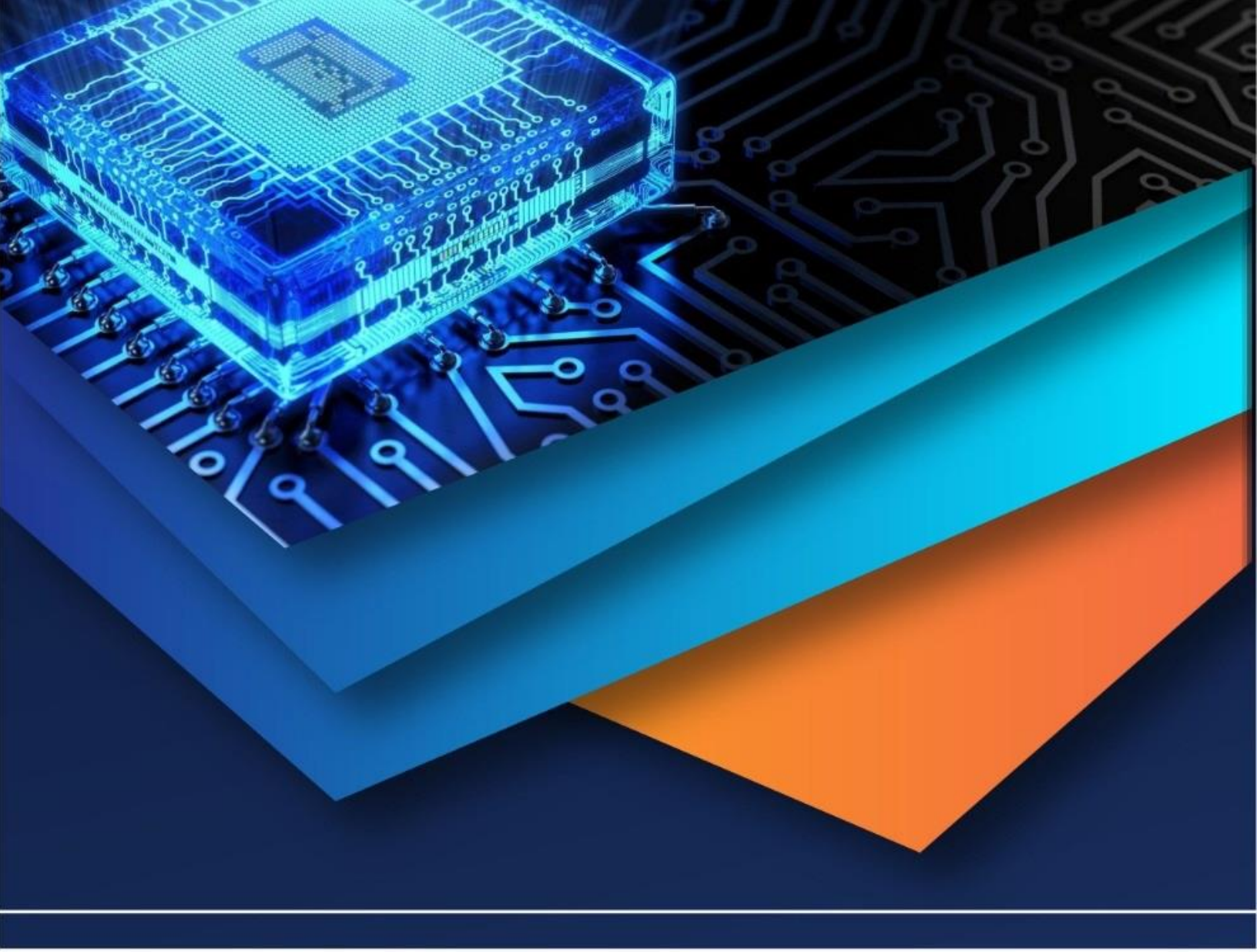

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