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EDU Forecast – Students Performance Predictor

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ABSTRACT: This document outlines a detailed model designed to forecast student performance within an educational institution through the application of machine learning, particularly utilizing Neural Networks. The primary objective of this model is to offer insights into the expected performance of students based on a variety of input factors. By leveraging a Neural Network, the model is capable of discerning intricate patterns and relationships between the input data and student outcomes, thereby delivering predictions that are more precise than those derived from conventional statistical approaches. Furthermore, the research investigates the importance of various features that may affect student performance. These features can encompass academic history, attendance records, involvement in extracurricular activities, demographic details, and socioeconomic status, among others. By evaluating the significance of each feature, the model identifies which factors are most closely associated with performance, thereby providing essential insights for educators, administrators, and policymakers. To assess the model's efficacy, an experiment is conducted utilizing actual student data. This experiment demonstrates the capability of Neural Networks to uncover latent patterns and generate dependable predictions. The findings indicate that machine learning methodologies can significantly contribute to improving educational outcomes by assisting institutions in identifying students who may need additional support.

KEYWORDS: Student Performance Predictor, Neural Network, Machine Learning.

I. INTRODUCTION

A significant number of research initiatives in the field of education have explored the application of machine learning methodologies to achieve various educational objectives. Among the primary aims of these investigations are the identification of high-risk students and the determination of factors that significantly impact student performance. Furthermore, this approach allows for the continuous monitoring of students' progress, thereby enabling assessments of their development over time. Such innovative strategies empower educational institutions to customize their resources and support according to the individual needs of each student, ultimately promoting growth and enhancing academic outcomes. In recent years, extensive studies have focused on leveraging machine learning techniques to tackle diverse challenges and improve educational results. Identifying students at risk of academic difficulties and understanding the key influences on student performance have emerged as critical objectives of this research. These insights enable educators to implement proactive strategies to support learners and enhance the overall effectiveness of education.

An advanced, data-centric educational technology known as the Edu Forecast-Students Performance Predictor has been developed to revolutionize the management of student performance within educational institutions. This innovative approach aims to enhance the educational experience for all stakeholders, including students, parents, educators, and administrators, by leveraging artificial intelligence (AI) and data analytics. The system provides valuable insights that can enhance academic outcomes by collecting, analyzing, and interpreting a wide range of data points, such as student attendance, academic grades, participation in class activities, and even social or behavioral patterns. A primary objective of the Edu Forecast system is to anticipate potential academic challenges before they escalate into significant issues. By employing machine learning models, the system can identify students who may be at risk of underperforming at an early stage, thereby enabling educators to implement timely and tailored interventions. This predictive capability can help reveal trends, such as declining grades or reduced class engagement, that may not be immediately noticeable to parents or teachers.

II. LITERATURE SURVEY

A. Prediction of Student Performance Using Machine Learning Techniques – Nitin Ramrao Yadav

Jawaharlal Nehru Engineering College, MGM University, Aurangabad, Maharashtra, India. (May 2023)

Finding:- This review shows the intended results of Learning Analytics, Prediction Analytics, and different Machine Learning algorithms and Data Mining techniques to improve student outcomes. This study shows that the machine learning technique is the most used approach to enhance student performance and helps teachers predict student achievements.

B. Student's performance prediction using AI and ML- Stephen Opoku Oppong

Department of ICT Education, University of Education, Winneba, Ghana.

Finding:- This study underscores that student academic performance is primarily influenced by their past performance but can also be impacted by external factors like social media interactions and living conditions. To manage the vast volume of data in educational institutions, employing feature selection or ranking techniques is essential. These methods not only reduce data dimensionality but also enhance the overall performance of machine learning models, ultimately aiding educators and institutions in making informed decisions to support students' success.

C. Predicting Student Performance Using Machine Learning: A Comparative Study Between Classification Algorithms – Alabbas Hayder

Mid Sweden University Master of Science in Computer Engineering/Thesis Project 15hp DT099G..... (June 2022) Finding:- The results indicated the effectiveness of ML algorithms in identifying student patterns, with SVM performing particularly well. Three key research questions were addressed: the suitability of ML for uncovering student patterns was confirmed, 8 implementation details were provided for SVM and ANN, and the importance of having sufficient data for reliable classification was emphasized.

D. Analysis and Prediction of Students' Academic Performance Based on Educational Data Mining - Guiyun Feng, Muwei Fan, Yu Chen (IEEE)

Springer-Verlag GmbH Germany, part of Springer Nature. (June 2021)

Finding:- This research combined unsupervised learning with the K-means algorithm to cluster student performance data, improving the objectivity and fairness of school evaluations. By optimizing the selection of clustering labels through objective statistics, the model achieved higher prediction accuracy and reliability in identifying students at academic risk, ultimately enhancing the effectiveness of the CNN model for this purpose.

E. Student-Performulator: Predicting Students' Academic Performance at Secondary and Intermediate Level Using Machine Learning-Muhammad Qasim Khan, Shah Hussain

Springer-Verlag GmbH Germany, part of Springer Nature. (June 2021)

Finding:-This approach recognizes that students within the same group may have different study behaviors. The study used knowledge areas to analyze student marks and grades, demonstrating that grades from one subject could predict a student's performance in the previous academic session. The proposed Genetic Algorithm-based decision tree classifier and regression methods achieved impressive results, with a classification accuracy for grade prediction.

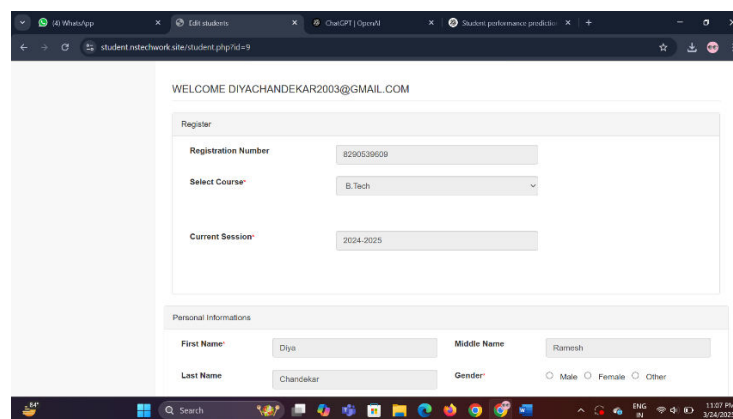
III. METHODOLOGY

The Student Performance Predictor website predicts student performance using an approach based on machine learning. Data is first gathered from a variety of sources, including as demographic information, extracurricular activity, academic history, and attendance. Then, to guarantee consistency, the data is preprocessed by cleaning, normalizing, and encoding. To train a neural network model, the dataset is divided into training and testing sets. Cross-validation and hyperparameter tuning are two methods used to optimize the model's performance during training. Following training, the model's accuracy is assessed using metrics such as precision, recall, and RMSE. Additionally, the significance of each feature is examined to determine the main factors affecting student success.

Users can enter student data and receive predictions using a web interface that deploys the trained model. Using APIs, the backend combines the model, and the frontend offers an intuitive user experience. In order to improve the model over time and incorporate real-time data, the system continuously collects feedback and tracks performance after deployment. The system will be improved by future versions that include dynamic prediction capabilities and more features.

IV. EXPERIMENTAL RESULTS

Figures shows the results of Students Performance from the data given by the the students or their guardian by using machine learning algorithm. Figs. (a) shows the Registrations details of the student. (b) shows the Personal Information of the student. (c) shows the Contact details of the student. (d) and (e) shows the academic information and the progress report of student where the shows that the student is excellent and good in studies and extracurricular or need to improve in that by denoting poor.



The screenshot displays a web browser window with the URL `student.ntechwork.site/student.php?id=9`. The page is titled "WELCOME DIYACHANDEKAR2003@GMAIL.COM". It contains two main sections: "Register" and "Personal Informations".

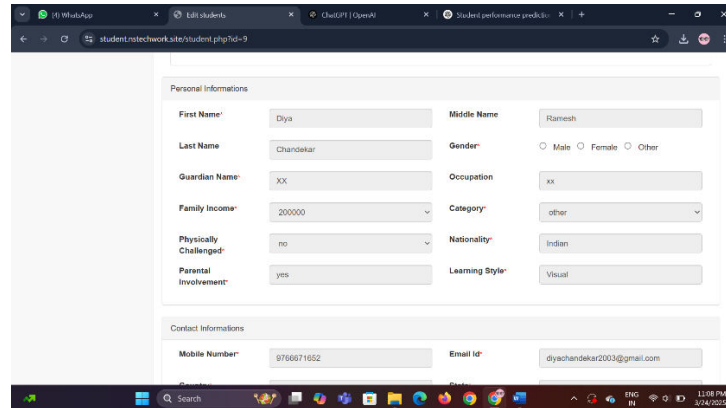
Register Section:

- Registration Number: 8290539609
- Select Course*: B.Tech
- Current Session*: 2024-2025

Personal Informations Section:

- First Name: Diya
- Middle Name: Ramesh
- Last Name: Chandekar
- Gender: ☐ Male ☐ Female ☐ Other

(a)



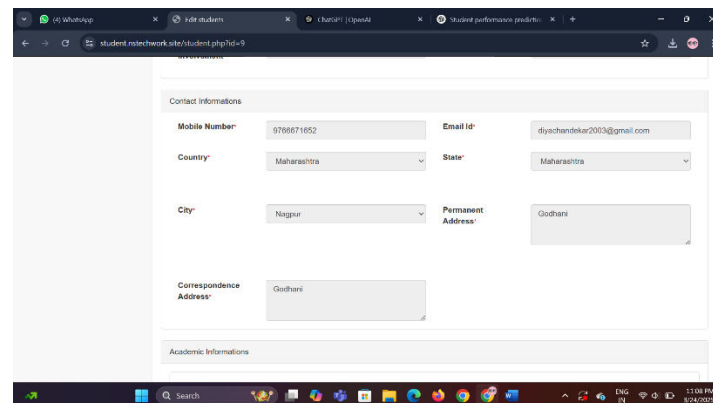
Personal Informations

First Name*	Diya	Middle Name	Ramesh
Last Name	Chandekar	Gender:	☐ Male ☐ Female ☐ Other
Guardian Name:	XX	Occupation	xx
Family Income*	200000	Category*	other
Physically Challenged*	no	Nationality*	Indian
Parental Involvement*	yes	Learning Style*	Visual

Contact Informations

Mobile Number*	9766671652	Email Id*	diychandekar2003@gmail.com
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(b)

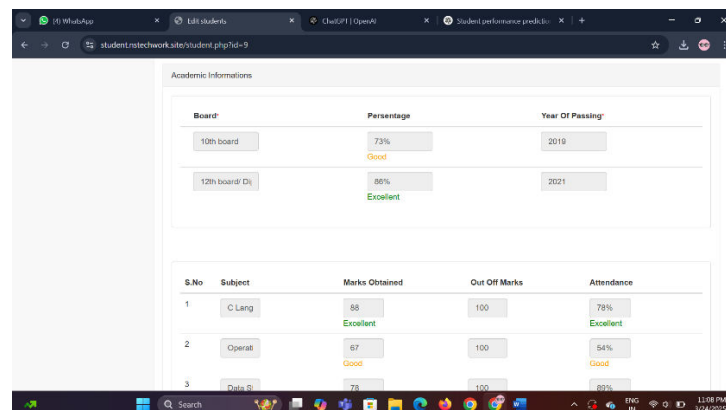


Contact Informations

Mobile Number*	9766671652	Email Id*	diychandekar2003@gmail.com
Country*	Maharashtra	State*	Maharashtra
City*	Nagpur	Permanent Address*	Godhara
Correspondence Address*	Godhara		

Academic Informations

(c)

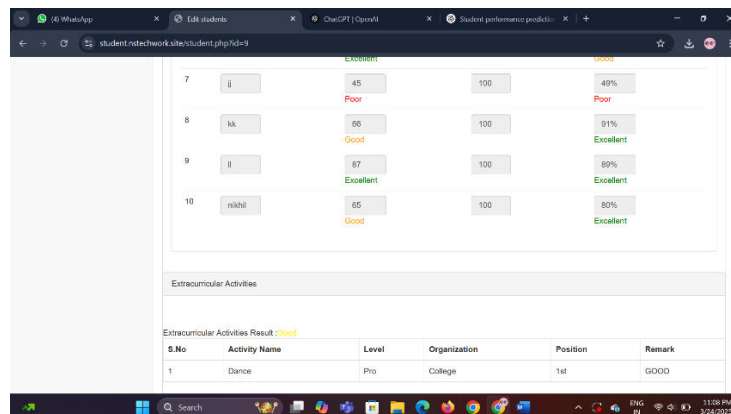


Academic Informations

Board*	Percentage	Year Of Passing*
10th board	73% Good	2019
12th board/ DI	95% Excellent	2021

S.No	Subject	Marks Obtained	Out Off Marks	Attendance
1	C Lang	88 Excellent	100	78% Excellent
2	Operat	67 Good	100	54% Good
3	Data B	78	100	83%

(d)



Student ID	Name	Score	Performance Level
7	ii	45	Poor
8	ka	66	Good
9	ii	87	Excellent
10	nishil	65	Good

S.No	Activity Name	Level	Organization	Position	Remark
1	Dance	Pro	College	1st	GOOD

(e)

VI. CONCLUSION

An Edu Forecast's output includes reports on classroom and school performance, individual student growth, trend analysis, benchmark comparisons, teacher evaluations, intervention recommendations, curriculum insights, and parent and student feedback channels. These findings encourage thoughtful decision-making with the goal of improving student growth, academic achievement, and educational quality.

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