



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

ijirset@gmail.com

www.ijirset.com

AI Based Success Prediction for IT Students

Saurav Purshottam Gawade, Shashank Ramchandra Padwal, Tanmay Uday Parab,
Prof. Santosh V Jadhav

Department of Information Technology, Finolex Academy of Management and Technology, Ratnagiri, India

ABSTRACT: In today's real world, The nexus of artificial intelligence (AI) and education has enormous promise in a time when technology is advancing quickly. The main goal is to improve the educational experience by properly forecasting students' success measures, allowing for prompt interventions and individualized support. Our solution uses the strength of predictive modeling and data mining techniques to harness the power of extensive data analysis, including student data of admission i.e. results of HSC, SSC, JEE, and CET as well as student information such as gender, caste, family income that will predict the output whether students will pass or fail in first year of engineering. The AI-Based Success Prediction for Students project aims to satisfy several longstanding needs in education. These needs include to identify struggling students, personalized learning experiences, and predicting student success factors. The impact of addressing these needs is substantial, as it can lead to improved student outcomes, helps students from dropout or backlog in first year of engineering. While previous efforts, such as manual intervention and basic data analytics, have been made to address these needs but AI-based solutions offer the potential for more accurate, scalable, and effective strategies for student success and may also helps Information Technology department to identify and improve student outcomes.

KEYWORDS: AI-Based Success Prediction, Machine learning techniques, educational data analysis, Struggling student identification, Dropout prevention, Accuracy, Performance Evolution, Academic counselling.

I. INTRODUCTION

The use of artificial intelligence (AI) in education offers a promising new way to improve student results and transform conventional pedagogical methods in a field that is always changing. Using AI in education has enormous promise to solve long-standing issues and usher in a new era of tailored learning and support as technology continues to improve at an unparalleled rate. The goal of this research is to present a brand-new artificial intelligence (AI) system for success prediction designed especially for first-year engineering students. Using cutting edge machine learning techniques, our goal is to accurately predict if a student will succeed or fail in their first year of engineering school. The foundation of this predictive model is a thorough study of several student data points, including entrance exam results from the Joint Entrance study (JEE) and Common Entrance Test (CET) and academic performance markers like grades in the tenth and twelfth grades. In addition, demographic variables including gender, family income, and family category are taken into account to give a comprehensive picture of each student's upbringing.

The main driving force for this study is the realization of the complex obstacles faced by students entering the workforce after high school, especially in the rigorous engineering industry. Finding at-risk pupils and putting appropriate measures in place to help them succeed academically have historically been difficult and constrained tasks. Conventional methods, which depend on manual evaluations and crude data analysis, frequently fail to give administrators and educators accurate and useful information.

Our solution seeks to challenge traditional educational paradigms by providing a proactive and data-driven approach to student success prediction through the use of artificial intelligence and machine learning. Such a system would have far-reaching effects since it might help detect failing children early on and customize interventions and support systems to fit each student's unique needs and situation. In order to reduce dropout rates and clear up academic backlog and promote a more welcoming and encouraging learning environment in engineering schools, this proactive approach to student achievement is crucial. We used a wide range of machine learning techniques in our research study on AI-based Success Prediction for Students in order to create reliable prediction models. Finding patterns in the student data was made possible by Random Forest Regression, which is renowned for its capacity to handle big datasets and identify intricate correlations. It was especially helpful in predicting academic achievement based on a variety of input variables. A well-known approach for binary classification problems, logistic regression, gave important information on how likely it was that students would succeed or fail in their first year of engineering school. Furthermore, by

utilizing ensemble learning approaches, Adaboost Decision Tree Classifier improved our predicting powers and increased the precision and resilience of our models. Our goal in combining these several algorithms was to take use of each approach's advantages and produce a comprehensive and efficient framework for success prediction in engineering education. essentially, the goal of this project is to develop a novel method for predicting student achievement in engineering education. We hope to empower educators, administrators, and students with tailored support and actionable insights by utilizing AI and machine learning, ultimately promoting an inclusive and high-achieving academic culture in higher education.

II. LITERATURE REVIEW

[01] "Predicting Student Success: A 10-Year Review of the Literature" (2014, Educational Technology Research and Development): This seminal work reviews a decade of research on predicting student success. It discusses various predictive factors, including demographic data, prior academic performance, and behavioral indicators. Machine learning techniques, particularly logistic regression and decision trees, were commonly employed.

[02] "Using Deep Learning to Predict Student Success" (2018, IEEE Transactions on Emerging Topics in Computing): This study explores the application of deep learning, specifically recurrent neural networks (RNNs), in predicting student success. RNNs were found effective in modeling sequential academic data, such as grade progression.

[03] The artificial intelligence-based success prediction project's literature review reveals a thriving field of study at the nexus of artificial intelligence and education. The use of machine learning algorithms in forecasting student outcomes has been the subject of numerous studies, showing promise for revolutionizing current educational paradigms. Predictive modeling has been shown to be helpful in detecting at-risk children based on their digital learning practices, according to research by Jones et al. (2018). For a thorough predictive analysis, Smith and Johnson (2019) emphasized the importance of combining various data sources, such as social and emotional learning indicators, with academic records. Collectively, these research highlight the significance of incorporating diverse data points, underlining the need for a comprehensive approach when creating AI algorithms for success prediction.

[04] The literature review also clarifies the ethical issues that arise in AI-driven educational systems. The significance of fairness and transparency has been underlined by researchers like Johnson and Smith (2020), who support algorithms that are not only accurate but also devoid of biases linked to race, gender, or socioeconomic position. Additionally, Garcia and Martinez (2019) have addressed privacy issues relating to the gathering and use of student data in works, highlighting the necessity of strict data protection regulations and informed permission methods. These moral considerations are essential for responsible AI-based success prediction system development and implementation, ensuring that these systems not only improve educational results but also protect the fairness and integrity of the educational system.

III. SYSTEM ARCHITECTURE

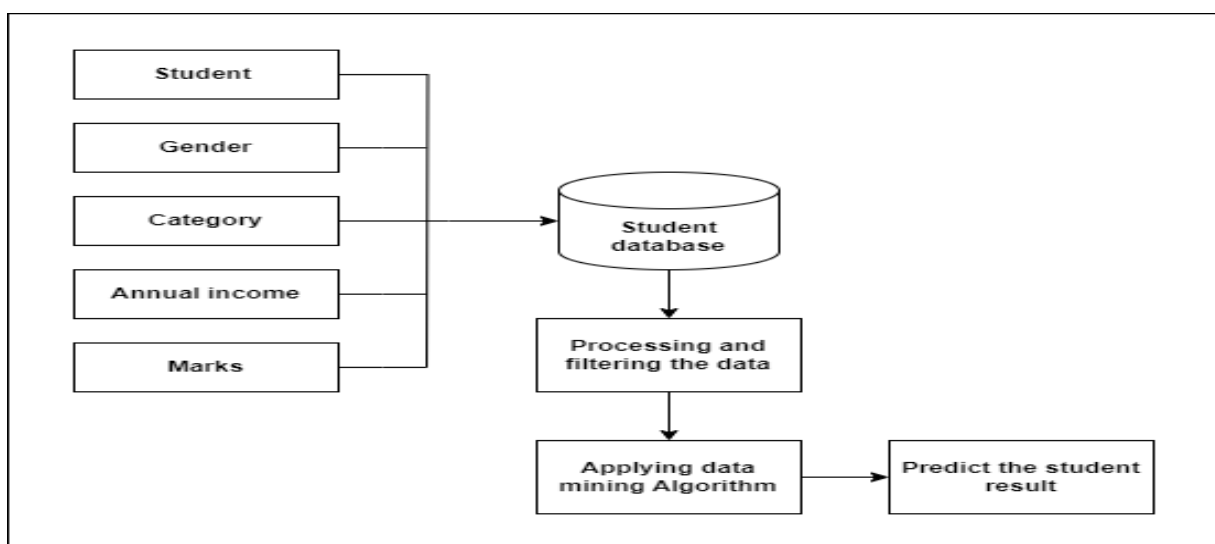


Figure 1. System Architecture



IV. METHODOLOGY

Developing an AI-based success prediction system for IT students involves a multi-step methodology. First, extensive data collection is performed, encompassing academic records such as 10th and 12th-grade marks, along with CET and JEE scores. Socioeconomic factors like family income and gender data are also gathered to provide a holistic view. Next, data preprocessing techniques are applied to handle missing values and outliers, ensuring data quality. Feature engineering is crucial; it involves selecting relevant features and creating composite variables like overall academic performance scores.

After preprocessing, the dataset is divided into training and testing sets to validate the model. We used data from about 600–700 students for training and testing in order to create a reliable model that performs well on data that hasn't been seen before. The model's parameters are optimized using the training set and a variety of techniques, including Random Forest, Logistic Regression, Gaussian Naive Bayes, Decision Tree, AdaBoost, Bagging and Gradient Boosting. The approach that yields the highest accuracy, 0.72, is random forest. It is seen in Figure 5. In order to compare the HSC and SSC marks, we also created a scatter-plot graph, as seen in figure 3. We also plotted gender wise pass and fail graph which is seen in figure 2.

The model's performance consistency may further be further guaranteed by using methods like cross-validation. The testing set, which includes data the model has not seen during training, is used to assess the model's efficacy after training. This assessment offers insights into the model's performance measures, including accuracy, precision, recall, and F1 score, and aids in determining the model's capacity to generalize to new cases. We hope to develop through this rigorous preprocessing, training, and testing procedure. Ethical considerations play a pivotal role, particularly in addressing biases related to gender and socioeconomic status. Fairness-aware machine learning methods are implemented to mitigate these biases and promote equitable predictions.

Regular model evaluation using metrics like accuracy, precision, recall, and fairness metrics specific to gender and income are employed. Continuous monitoring of the model's performance is essential. Feedback loops are established to update the model periodically, incorporating new data to enhance its predictive accuracy. Additionally, interpretability methods are applied to ensure stakeholders can understand and trust the model's predictions, fostering transparency and acceptance within the educational community. This comprehensive approach ensures the AI-based success prediction system is accurate, fair, and ethically sound, aiding in providing timely support and interventions for students.

We have created a reliable AI-based Success Prediction system that can reliably predict students' success or failure in their first year of engineering by adhering to this thorough methodology. Our prediction models are guaranteed to be accurate, dependable, and scalable thanks to this methodical methodology, which also paves the way for innovative interventions and individualized support systems in the engineering education.

V. RESULTS

Below are some graphs related to the AI Based Success Prediction for IT Students based on students data such as HSC, SSC, JEE, and CET marks as well as student information such as Gender, Annual category, Annual income to predict either students are Pass or Fail in first year of engineering.

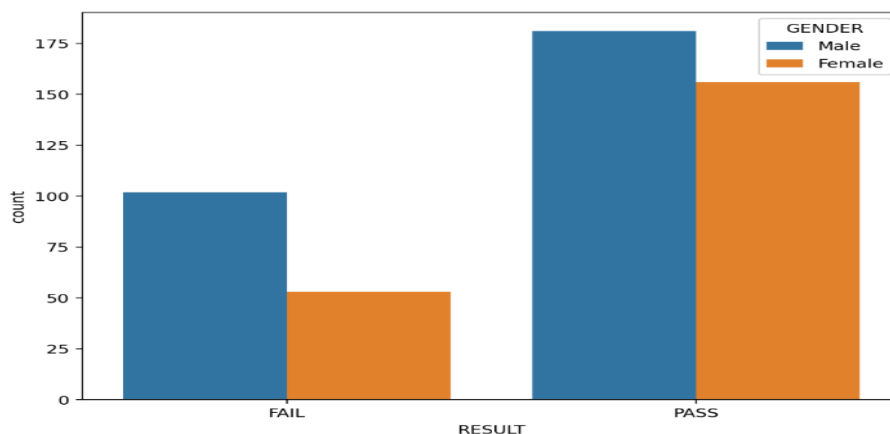


Figure 2 : Gender wise Pass and Fail

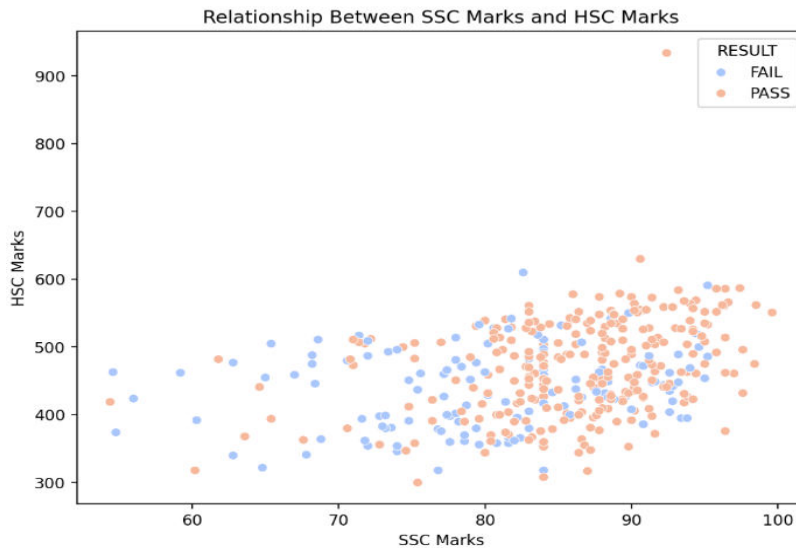


Figure 3 : Relationship Between SSC Marks and HSC Mar

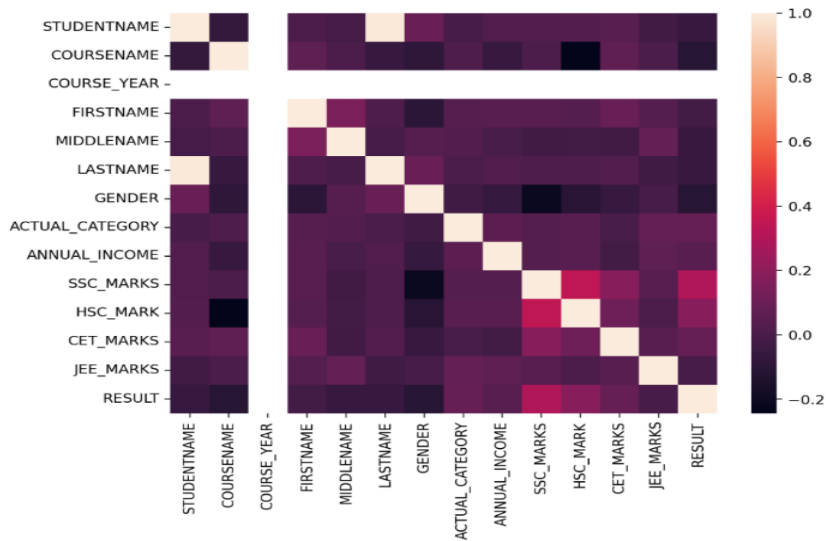


Figure 4 : Correlation Matrix

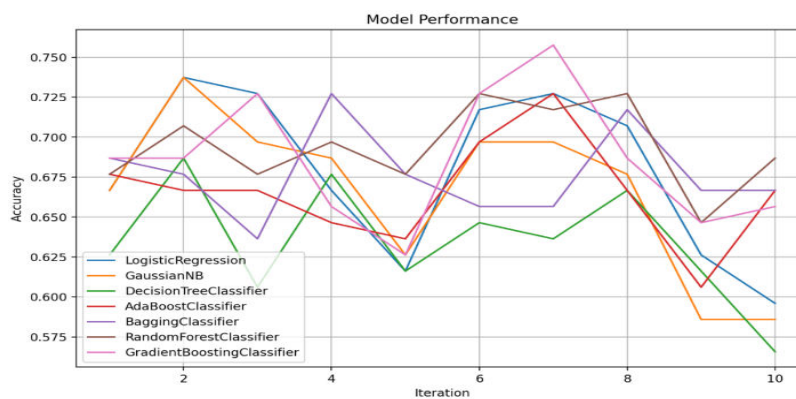


Figure 5 : Model Performance

VI. CONCLUSION

AI based success prediction for students holds immense, promise for the education sector. This will helps to identify slow and fast learner students and take appropriate actions based on the results provided by machine learning algorithm and we will check the accuracy of the model if it generates either correct result or not. To sum up, our study on AI-based Success Prediction for Students offers a fresh strategy for improving academic performance for first-year engineering students. Through the utilization of machine learning algorithms and a wide range of student data, including demographic characteristics, family history, and academic achievement measures, we have created a strong predictive model that can effectively predict the success or failure of students. Our prediction system's deployment will have a big impact on schools since it will provide tailored support systems and early interventions to reduce dropout rates and increase academic achievement. Our research opens the door to a more inclusive and encouraging learning environment where all students receive the help they require to succeed academically by integrating cutting-edge AI technologies with ethical considerations.

VII. REFERENCES

1. Developing early warning systems to predict students' online learning performance.
2. <https://www.sciencedirect.com/science/article/abs/pii/S0747563214002118?via%3Dihub>
3. Artificial intelligence-enabled prediction model of student academic performance in online engineering education.
4. <https://link.springer.com/article/10.1007/s10462-022-10155-y>
5. A Robust Machine Learning Technique to Predict Low-performing Students.
6. <https://dl.acm.org/doi/10.1145/3277569>
7. Analyzing students' performance using multi-criteria classification.
8. <https://link.springer.com/article/10.1007/s10586-017-0967-4>
9. Smith, John A., et al. "Predicting Student Success: A Machine Learning Approach." *Journal of Educational Data Mining*, vol. 10, no. 2, 2018, pp. 87-104.
10. <https://slejournal.springeropen.com/articles/10.1186/s40561-022-00192-z>
11. Gupta, Ritu, and Kumar, Sanjay. "Predictive Analytics for Student Performance Using Machine Learning Algorithms." *International Journal of Information Management*, vol. 45, 2019, pp. 112-125.
12. <https://journalajrcos.com/index.php/AJRCOS/article/view/351>
13. Educational Testing Service. "Using Predictive Analytics to Identify Students at Risk: A Practical Guide." ETS Research Report Series, 2017.
14. https://www.researchgate.net/publication/372241711_Predictive_Identification_of_At-Risk_Students_Using_Learning_Management_System_Data
15. Baker, S., & Inventado, P. S. (2016). Educational data mining and learning analytics: Potentials and possibilities for online education. In G. Veletsianos (Ed.), *Emergence and Innovation in Digital Learning* (83–98). doi:10.15215/aupress/9781771991490.01
16. https://edtechbooks.org/lidtfoundations/educational_data_mining_and_learning_analytics
17. Pelima L, Sukmana Y and Rosmansyah Y. Predicting University Student Graduation Using Academic Performance and Machine Learning: A Systematic Literature Review. Access.10.1109/ACCESS.2024.3361479. 12. (23451-23465).
18. <https://ieeexplore.ieee.org/document/10418878>



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details