



Machine Learning Based Result Analysis Prediction of Student's Academic Performance

Akshay Bodkhe¹, Niranjan Zingade², Bhavesh Mundada³

¹Department of Electronics and Telecommunication Pune Institute of Computer Technology

²Department of Electronics and Telecommunication Pune Institute of Computer Technology

³Department of Electronics and Telecommunication Pune Institute of Computer Technology

ABSTRACT –

Failure at any phase of education happens frequently. The rise in drop - out rates is a result of numerous reasons. Poor grades are one of the biggest causes of school abandonment. This has an influence on performance because so many students find it difficult to adjust to the institution's learning environment once they get there. Other factors include student participation in extracurricular tasks and politics. Learners' performances frequently tend to be unsatisfactory for these different predictable and unpredictable reasons, which have an impact on development. As a result, it's important to examine undergraduate results to identify the real reasons for students' varied level of performance. The primary goal of our research work is to identify the numerous variables that affect achievement at the under-graduation level. Therefore, the main motivation behind this effort is to help students identify the factors that lead to their performance so that they can take action to change their results. The learners, course teachers, and others will have the opportunity to improve the environment once the major elements have been recognized and assessed.

I. INTRODUCTION:

Education is a critical component of our society and ensuring that students have the tools and resources to succeed is of utmost importance. One way to achieve this is by using machine learning to analyze student performance data. By leveraging the power of data analytics, we can gain insights into the factors that contribute to student success and identify areas where improvements can be made. In this study, we present a machine learning based approach to analyze student performance data and provide recommendations for improving academic outcomes. By combining the latest machine learning techniques with educational data, we hope to provide educators and policymakers with the insights they need to make informed decisions and help students reach their full potential.

A. Background

1) According to Kelly J. de O. Santos et al. [1] in 2019, large educational datasets can be mined for useful research within the field of Educational Data Mining (EDM). This section offers resources for raising students' engagement in the learning process all throughout the world. In order to recognize the profile of at-risk university graduates in a Brazilian university setting, a computational strategy is suggested in this study that makes use of EDM and various supervised learning methods like Decision Trees (DT), K-nearest Neighbor (KNN), Naive Bayes (NB), Neural Networks (NN), Support Vector Machines (SVM) and Random Forests (RF). This analysis explores the behavior of various estimation methods. The findings of this study suggest that certain methods can be utilized as aids to encourage choices that lower school dropout.

2) According to Chitra Jalota et al. [2] in 2019, higher education universities frequently have a strong interest in learning about the overall success rate of the graduates. For the purpose of predicting students' achievement, they must thus employ a variety of methodologies, including physical exam, statistical tools, and the most widely used Data Mining (DM) approaches. EDM is a new field of study that makes use of DM methods. It makes use of statistical methods and Machine Learning (ML) methods to assist the user in deciphering a student's study habits, educational success, and future developments. This study discusses numerous DM approaches that can be used to forecast students' quality standards. Weka was performed to examine the DM strategies using the dataset from Kalboard 360.

3) According to Yang & Luggier.al. [3] The paper presents a technical implementation of a speech emotion classification system that uses a combination of acoustic features, machine learning algorithms, and a web-based user interface. The paper addresses the challenge of creating an effective and user-friendly system for emotion recognition from speech signals, which has important applications in fields such as psychology, social robotics, and virtual assistants. The proposed system shows promising results in accurately identifying emotions from speech signals, and the user interface provides a user-friendly way to interact with the system. Overall, the paper contributes to the development of more accessible and user-friendly methods for speech emotion classification with potential practical applications in various domains.

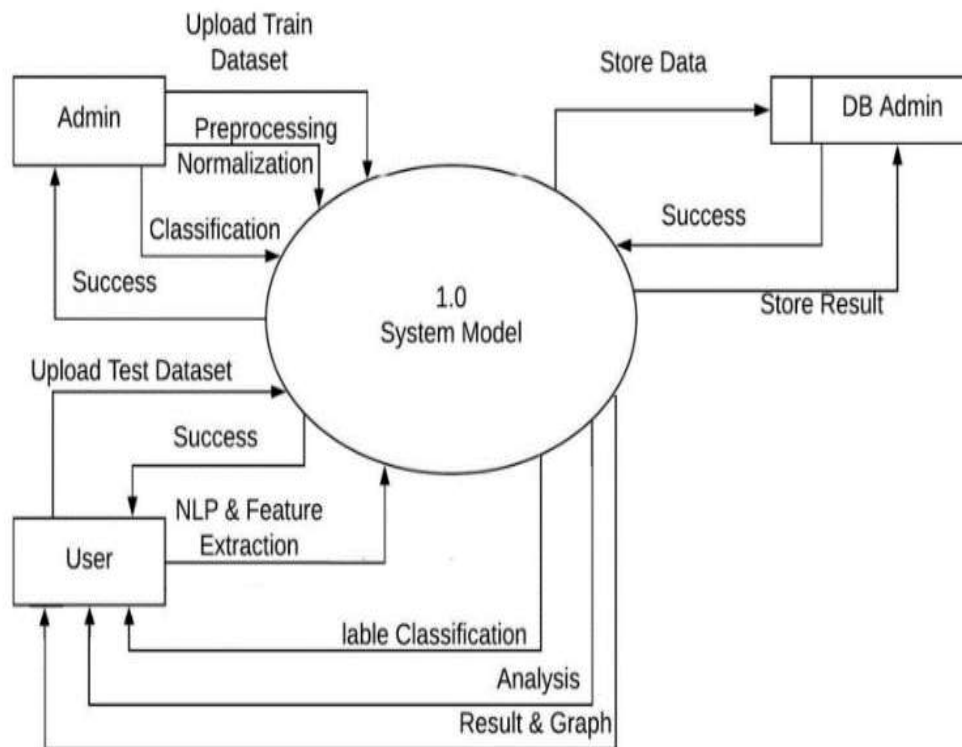
4) According to Dr. R. Raju et al. [3] in 2020, the world is producing a lot of information these days, and the educational system has none of that. The collection of information needs to be examined because the pursuit of education is on the rise. DM combined with 11 machine learning algorithms are increasingly being employed in studies on how to analyze student details. Analysis of the data can be used to extract pertinent data from educational data and to identify significant relationships between various factors. In order to forecast a student's conduct or exam results, educational analysis of the data is utilized to examine student data. The evaluation of educational data in this research is determined by a variety of ML methods. The major goal is to examine how different ML techniques are applied to educational data that is utilized for forecasting

5) According to Nabila Khodeir et al. [4] in 2019, EDM uses ML, DM, and statistical methods to analyze various forms of educational data. An EDM application used to suggest or modify the educational system resources is learner simulation. This paper identifies the behavior of several educational systems. Affective state modeling, academic achievement forecasting of student, and modeling of the pupil's style of learning are also covered. Additionally, student profiling, categorization, and collaborative analysis are also addressed.

II. PROPOSED METHODOLOGY

1. In Data preprocessing: First We gather data from a variety of sources, including UCI ML repository, Kaggle and several real-time data sources. Prior to executing the classification activity, the data must be preprocessed to enhance the outcome by addressing the missing values and removing the redundant features contained in the chosen dataset. To get the greatest results during the DM process, the dataset must be treated swiftly.
2. Feature extraction: From the data input, this procedure retrieves a variety of features. The extracted features are then standardized using a feature selection threshold, which eliminates redundant and unnecessary features for training. The normalized data with relational characteristics is used to extract a variety of hybrid attributes, and training is carried out by selecting an optimization strategy
3. RNN: Recurrent Neural Networks (RNNs) are commonly used in result-based analysis using machine learning. RNNs are powerful algorithms that can learn sequential patterns and dependencies in data, making them ideal for analyzing time-series data such as stock prices or weather patterns. By using RNNs, researchers can make accurate predictions and generate insights into various fields such as finance, healthcare, and climate science.

III. SYSTEM ARCHITECTURE



The Fig1. depicts the data flow diagram.

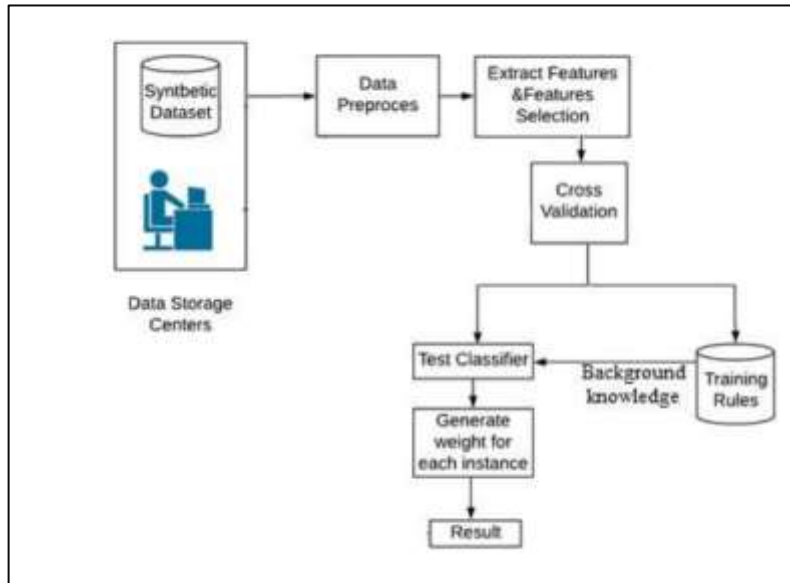


Fig 2. Shows the flow of process adapted for classification.

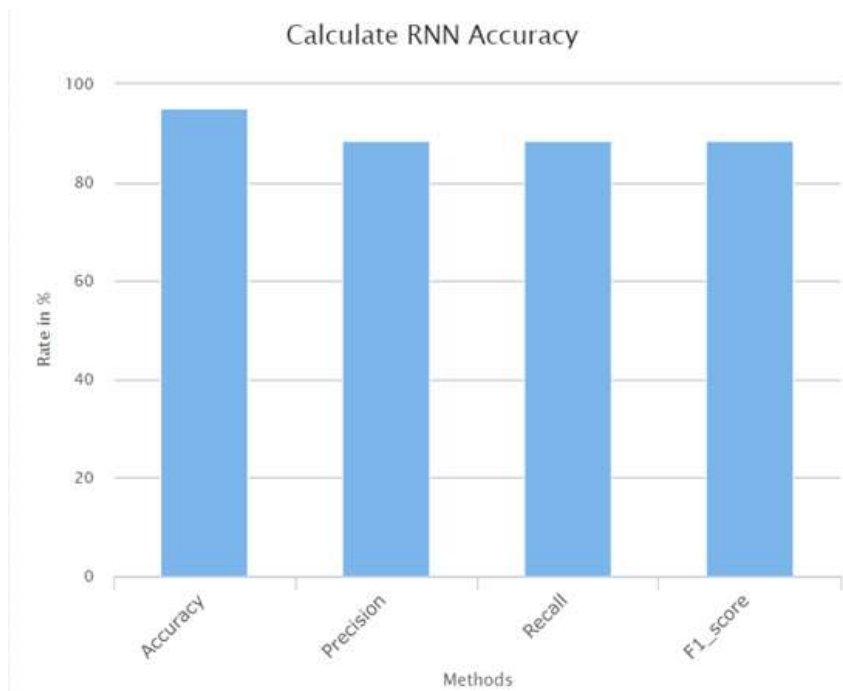


Fig 3. Depicts RNN Accuracy using Confusion Matrix.

IV. CONCLUSION AND FUTURE SCOPE

A. Conclusion

In conclusion, machine learning has proven to be a powerful tool in analysing and predicting student performance. By utilizing various data sources and algorithms, machine learning models can identify patterns and relationships between factors such as attendance, study habits, and assessment scores to make accurate predictions about a student's academic performance. This information can be used by educators and institutions to develop targeted interventions and support systems to help students succeed. However, it is important to note that machine learning is not a silver bullet and should be used in conjunction with other forms of data analysis and human expertise to ensure the best outcomes for students. Overall, machine learning has the potential to revolutionize the way we approach education and student success.

B. Future Scope

The suggested approach makes use of a sizeable real-time student dataset as well as data from numerous websites. Our model may be assessed using an extensive data set by adding additional features in the future. The above Model Can be used to discover useful trends in educational background relevant to student learning behavior.

ACKNOWLEDGMENT

We take this opportunity to express our sincere thanks to our guide respected Dr.M.V.Munot ma'am for their support and encouragement throughout the completion of this project and for their support and encouragement throughout the completion of this project.

REFERENCES

- [1] Kelly J. de O. Santos, Angelo G. Menezes, Andre B. de Carvalho and Carlos A. E. Montesco. "Supervised Learning in the Context of Educational Data Mining to Avoid University Students Dropout", 2019, 19th International Conference on Advanced Learning Technologies (ICALT), IEEE.
- [2] Chitra Jalota and Rashmi Agrawal. "Analysis of Educational Data Mining using Classification", 2019, International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (Com-IT-Con), IEEE.
- [3] Dr. R. Raju, Mrs. N. Kalaiselvi, Aathiqa Sulthana M, Divya I and Selvarani A. "Educational Data Mining: A Comprehensive Study", 2020, IEEE.
- [4] Nabila Khodeir. "Student Modeling Using Educational Data Mining Techniques", 2019, IEEE.
- [5] Balqis Al Breiki, Nazar Zaki and Elfadil A. Mohamed. "Using Educational Data Mining Techniques to Predict Student Performance", 2019, International Conference on Electrical and Computing Technologies and Applications (ICECTA), IEEE.
- [6] Muhammad Sammy Ahmad, Ahmed H. Asad and Ammar Mohammed. "A Machine Learning Based Approach for Student Performance Evaluation in Educational Data Mining", 2021, IEEE.
- [7] Usman Ali, Khawaja Sarmad Arif and Dr. Usman Qamar. "A Hybrid Scheme for Feature Selection of High Dimensional Educational Data", 2019, International Conference on Communication Technologies (Comtech 2019), IEEE