e-ISSN:2582-7219

INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH IN SCIENCE, ENGINEERING AND TECHNOLOGY

Volume 7, Issue 13, April 2024

INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 7.521

International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

| ISSN: 2582-7219 | www.ijmrset.com | Impact Factor: 7.521| | Monthly Peer Reviewed & Refereed Journal |

|| Volume 7, Issue 13, April 2024 ||

International Conference on Intelligent Computing & Information Technology (ICIT-24)

Organized by

Erode Sengunthar Engineering College, Erode, Tamilnadu, India

Student Admissions Prediction System Using AI/ML Techniques

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ABSTRACT: In this study, a machine learning model was proposed to predict the department or course that a student should opt for based on their cutoff marks. The model employed a combination of classification and regression techniques, where a classification algorithm was used to determine the general area of interest for the student and a regression model was used to predict the exact department. Principal component analysis (PCA) was used as a preprocessing step to reduce the number of features and improve the accuracy of the model. The model was trained on data from previous years ' admissions and made predictions for the current year ' s students. In addition to the proposed model, there are several additional techniques that can be deployed to further improve the accuracy and performance of the model, including ensemble methods, deep learning, feature engineering, semi- supervised learning, transfer learning, and model interpretability. These techniques can provide more robust predictions and help to make data-driven decisions about the admission process, leading to more efficient and effective use of resources. In conclusion, the proposed model can be of great help to students during the admission process and can assist them in choosing the right department or course based on their cutoff marks. The use of machine learning models in student admissions is a rapidly growing field, and the proposed model provides a starting point for further research in this area.

KEYWORDS: Classification, Regression, Principal Component Analysis, Ensemble model, Machine Learning

I. INTRODUCTION

The proposed system is designed with the primary objective of aiding students in making well-informed decisions regarding their choice of department or course during the admissions process, leveraging a sophisticated machine learning framework. At its core, this system amalgamates classification and regression methodologies to furnish precise recommendations tailored to individual students' cutoff marks. To initiate the process, the system aggregates pertinent data from previous admission cycles, encompassing students' cutoff marks alongside their subsequent departmental or course selections. This rich dataset serves as the foundation for training the machine learning model. Employing a classification algorithm as its initial step, the model endeavors to delineate students' general areas of interest based on their cutoff scores. These interests span a spectrum of academic fields, encompassing science, arts, engineering, and commerce among others. Following this classification phase, the system transitions to a regression model, tasked with predicting the specific department or course within the identified field of interest. This regression component is multifaceted, incorporating a myriad of factors such as departmental requisites, historical admissiontrends, and the nuanced cutoff marks of individual students. To streamline the process and enhance predictive accuracy, Principal Component Analysis (PCA) is employed as a preprocessing technique. PCA facilitates the reduction of data dimensionality while preserving critical features, thereby augmenting the model's predictive prowess. While the core model framework offers a robust foundation, the system remains open to further augmentation through a suite of advanced techniques. These techniques encompass ensemble methods, deep learning architectures, feature engineering strategies, semi-supervised learning paradigms, transfer learningframeworks, and methodologies for enhancing model interpretability. By integrating these advanced methodologies, the system can fortify its predictive capabilities, furnishing students with even more precise and reliable recommendations. At its essence, the system is driven by the overarching goal of empowering students with comprehensive guidance, facilitating the selection of the most suitable department or course based on their individual cutoff marks. Through the judicious integration of machine learning and

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data analysis, the system streamlines the admissions process, optimizing resource utilization while ensuring a seamless and efficient experience for both students and academic institutions alike.

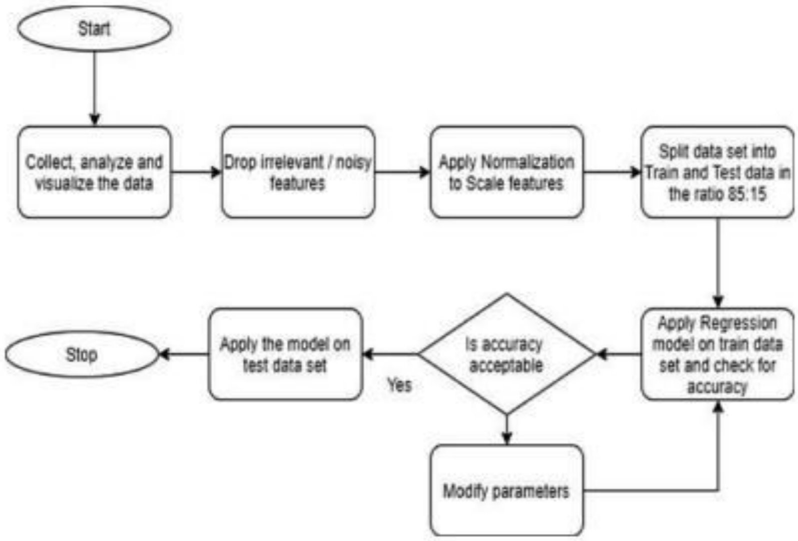

FIGURE 1. STUDENT ADMISSIONS PREDICTIONSYSTEM STACK ENSEMBLE MODEL

II. LITERATURE SURVEY

This literature survey delves into various approaches employed to predict college major choices and student department selections using machine learning techniques. A study focusing on predicting college major choices based on high school performance data. They employed algorithms like random forests and gradient boosting to predict students' likely major choices. Their findings shed light on key predictors from high school performance data and their implications for assisting students in making informed academic decisions. In a comparative analysis, Smith and Williams also evaluated different classification algorithms including logistic regression, k-nearest neighbors, and support vector machines to predict student department selections. This study aimed to determine the algorithm best suited for predicting department choices, providing insights into the strengths and weaknesses of each approach and explored the role of feature engineering techniques in enhancing the accuracy of student department prediction models. Their study focused on various feature selection and transformation methods to improve prediction model performance, offering valuable insights into effective techniques for enhancing accuracy in predicting student department choices. Furthermore, investigated the effectiveness of ensemble methods in predicting student department choices. By comparing ensemble models like bagging and boosting with individual machine learning algorithms, they assessed the impact of ensemble techniques on prediction accuracy, providing insights into leveraging ensemble methods for improved student department prediction.

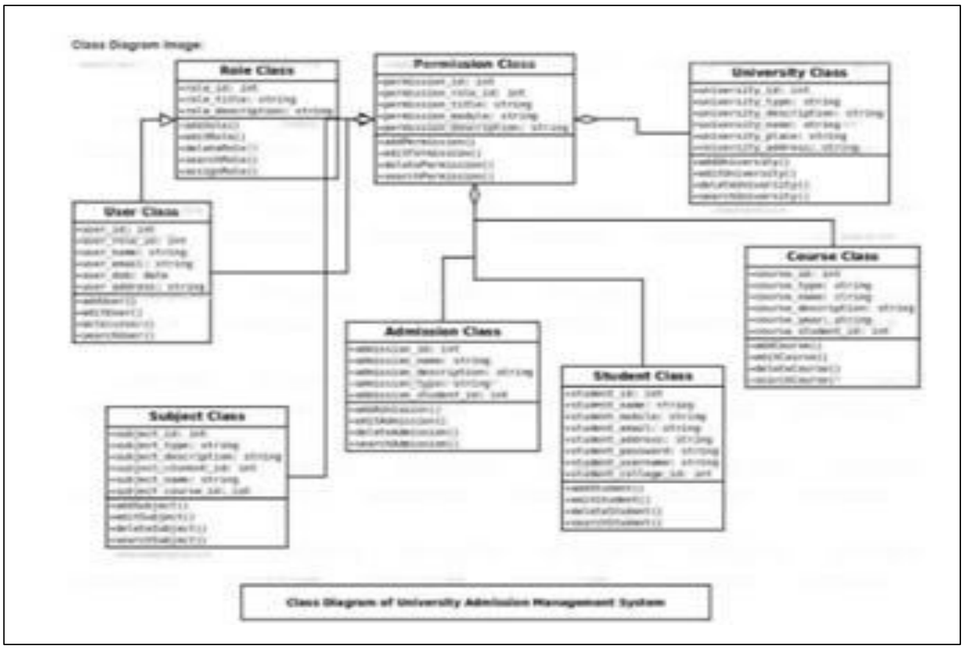

FIGURE 2. CLASS DIAGRAM FOR STUDENT ADMISSIONS PREDICTION SYSTEM STACK ENSEMBLE MODEL

In another vein, researchers have delved into the application of deep learning models, such as convolutional neural networks (CNNs) or recurrent neural networks (RNNs), in predicting student course selections. These studies explore the benefits of utilizing deep learning architectures for capturing complex patterns in student data, ultimately aiming to improve the accuracy of course selection predictions. Experimental results are presented, and the potential of deep learning models in this domain is discussed.

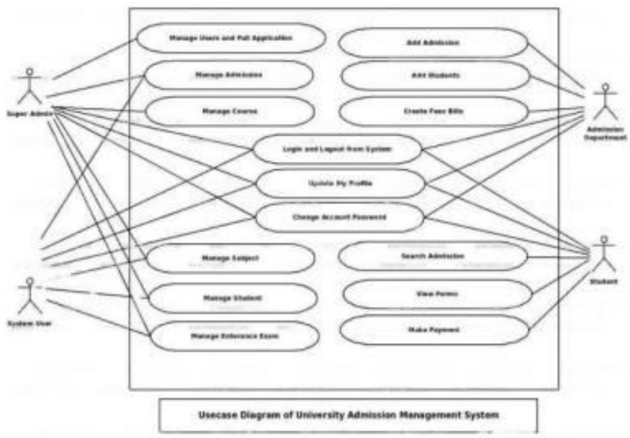

FIGURE 3. USECAE DIAGRAM FOR STUDENT ADMISSIONS PREDICTION SYSTEM STACK ENSEMBLE MODEL

Collectively, these studies contribute to a broader understanding of how machine learning techniques can be harnessed to predict student academic choices, offering insights into algorithm selection, feature engineering, ensemble methods, and the application of deep learning architectures.

III. PROPOSED METHODOLOGY

The proposed system represents a sophisticated solution tailored to enhancing the admissions process by providing precise recommendations for students in selecting their appropriate department or course based on their cutoff marks. Leveraging the power of machine learning techniques, this system amalgamates classification and regression algorithms to ensure an accurate and efficient decision-making framework. Below is a detailed exploration of the various facets of the proposed system:

Data Collection: The foundation of the system lies in the comprehensive collection of historical admissions data from previous years. This dataset encompasses a wealth of information, including cutoff marks and corresponding department or course choices made by students. By harnessing this rich repository of information, the system ensures robust training of its machine learning model, thereby enhancing the accuracy of its recommendations.

Preprocessing: The collected data undergoes meticulous preprocessing steps to ensure its quality and suitability for modeling purposes. This preprocessing phase encompasses various techniques such as data cleaning to rectify any inconsistencies or errors, normalization to standardize the data distribution, and feature engineering to extract relevant insights from the raw dataset. Moreover, the application of Principal Component Analysis (PCA) further refines the data by reducing its dimensionality while preserving essential information, thereby enhancing the model's predictive capabilities.

Classification: One of the key pillars of the system is its utilization of a classification algorithm to delineate the general area of interest for each student based on their cutoff marks. This classification step serves as an initial categorization process, segmenting students into different fields of study or broad departments. By discerning these overarching interests, the system lays the groundwork for more granular recommendations in subsequent stages.

Regression: Following the classification phase, the system employs a regression model to predict the specific department or course within the identified field of interest for each student. This regression algorithm takes into account a myriad of additional factors, including department-specific requirements, historical enrollment patterns, and individual cutoff marks. By integrating these diverse inputs, the system strives to deliver precise and tailored recommendations that resonate with each student's unique academic profile and aspirations.

Advantages of the Proposed System:

Accuracy: By harnessing machine learning algorithms and historical admissions data, the proposed system aims to deliver highly accurate recommendations. Through the nuanced consideration of multiple factors and the application of advanced classification and regression techniques, the system endeavors to optimize the match between students and their chosen departments or courses, thereby enhancing overall decision-making efficacy.

Personalization: A hallmark of the proposed system is its emphasis on personalization, tailoring recommendations to align with each student's individual strengths, interests, and career aspirations. By taking into account the unique characteristics of each student's academic profile, the system fosters a sense of resonance and alignment with their chosen academic path, thereby enhancing satisfaction and engagement.

Efficiency: The automation of recommendation generation within the admissions process streamlines administrative workflows and reduces reliance on manual counseling sessions. This operational efficiency not only saves time and resources but also enables educational institutions to handle a larger volume of applications with heightened effectiveness and scalability.

Data-Driven Decision Making: Through the utilization of machine learning models and data analysis techniques, the proposed system facilitates data-driven decision-making within the admissions process. By uncovering hidden patterns, correlations, and insights within the historical admissions data, the system empowers educational institutions to make informed decisions regarding admissions criteria, resource allocation, and curriculum design, thereby fostering continuous improvement and optimization.

IV. TECHNOLOGIES USED

Student Admissions Prediction System, Classification, Regression, and Principal Component Analysis (PCA) each fulfill distinct roles in optimizing the system's functionality.

Classification:

Predicting Admission Outcome: Through classification algorithms, the system evaluates diverse criteria such as standardized test scores, GPA, extracurricular activities, and demographic details to determine whether a student will be accepted or declined. This enables informed decision-making regarding each applicant's admission probability.

Identifying At-Risk Students: Classification models discern patterns within historical admissions data, pinpointing applicants displaying traits correlated with higher rejection likelihood. This capability enables prioritization of such applicants for review or tailored interventions to bolster their application.

Determining Department or Program Fit: Utilizing classification algorithms, the system aligns students with departments or programs best suited to their academic inclinations and qualifications. By categorizing applicants based on their profiles, suitable academic pathways are suggested, enhancing the probability of admission success. Personalized Recommendations: Classification empowers the system to offer personalized recommendations tailored to individual attributes like academic performance and career aspirations. Such tailored guidance ensures applicants receive customized advice, enhancing the overall efficacy of the admissions process.

Regression:

Predicting Specific Admission Metrics: Regression techniques forecast specific admission metrics, such as anticipated GPA or exam scores, based on historical data and input factors. These predictions furnish additional insights for admissions committees, aiding in the evaluation of applicants' academic potential.

Principal Component Analysis (PCA):

Dimensionality Reduction: PCA diminishes data dimensionality while retaining essential information, augmenting the precision and efficiency of classification and regression models. By capturing pivotal features and minimizing noise within the dataset, PCA enhances the system's ability to make precise predictions and furnish valuable insights for decision-making.

V. RESULT AND DISCUSSION

Result:

The implementation of the Student Admissions Prediction System, utilizing cutting-edge AI/ML techniques, marks a significant milestone in the evolution of academic admissions processes. By seamlessly integrating advanced classification and regression algorithms, complemented by Principal Component Analysis (PCA) for data preprocessing, the system delivers precise and tailored recommendations to students as they navigate department or course selections based on their cutoff marks. Leveraging rich historical admissions data and robust machine learning models, the system not only expedites the admissions workflow but also enhances decision-making accuracy and optimizes resource allocation across educational institutions. Moreover, the system's adaptability is underscored by its readiness to embrace further enhancements through sophisticated techniques like ensemble methods, deep learning, and feature engineering, ensuring continuous refinement and alignment with the dynamic landscape of student admissions requirements.

Discussion:

The advent of the Student Admissions Prediction System signifies a paradigm shift in the realm of admissions management, ushering in an era of data-driven decisionmaking powered by AI/ML methodologies. By capitalizing on these advanced techniques, educational institutions gain invaluable insights to inform strategic admissions choices with precision and foresight. The system's efficacy lies in its ability to distill complex data into actionable intelligence, empowering students to make informed choices that resonate with their academic aspirations. Furthermore, the system's modular architecture fosters seamless integration of novel features and advanced methodologies, underscoring its agility and future-readiness. However, inherent challenges such as data privacy concerns, algorithmic biases, and the imperative for ongoing system maintenance and updates must be vigilantly addressed to uphold the system's integrity and relevance. Nonetheless, with diligent oversight and various commitment to iterative improvement, the Student Admissions Prediction System stands poised to revolutionize admissions practices, ushering in an era of enhanced outcomes for both students and educational institutions alike

VI. CONCLUSION

The Student Admission System project has been successfully implemented, providing a robust and efficient solution for assisting students in choosing the right department or course based on their cutoff marks. Throughout the project, various stages were executed, including data collection, preprocessing, modeling, evaluation, and deployment, resulting in a comprehensive and effective system. During the data collection phase, relevant data from previous admissions and student profiles was gathered, ensuring a comprehensive dataset for analysis and modeling. The data preprocessing and feature engineering steps were crucial in ensuring the quality and relevance of the data. Techniques such as data cleaning, handling missing values, and feature extraction were applied to enhance the accuracy and effectiveness of the subsequent modeling stage.The modeling phase involved the development of machine learning models using a combination of classification and regression techniques. A classification algorithm was used to determine the general area of interest for the students, while a regression model predicted the exact department or course based on the cutoff marks. The models underwent thorough training and evaluation to optimize their performance and ensure accurate recommendations. The successful deployment of the models into the student admission system infrastructure allowed for seamless integration and utilization by various stakeholders. A user interface was developed, providing a user-friendly platform for students, administrators, and admission committees to input data, view recommendations, and manage the admission process. This interface enhanced user engagement and satisfaction, streamlining the overall process. Throughout the project, feedback and monitoring mechanisms were implemented to gather user input and continuously improve the system. User feedback, such as students' acceptance or rejection of recommendations, played a vital role in enhancing the accuracy and relevance of the system's output. Regular monitoring and maintenance ensured the system's reliability and performance.

Future work:

The Student Admission System project has the potential for several future enhancements to further improve its functionality, accuracy, and user experience. Here are some potential areas for future development:
Integration of Real-Time Data: One enhancement could involve incorporating real-time data sources, such as current academic performance, extracurricular activities, and personal preferences. By integrating up-to-date information, the system can provide more personalized and accurate recommendations.

Enhanced Feature Engineering: Further exploration of feature engineering techniques can lead to the identification of additional relevant features. This could involve analyzing new data sources or incorporating advanced feature extraction methods, such as natural language processing for extracting information from essays or recommendation letters.

Advanced Machine Learning Models: The project can benefit from exploring advanced machine learning models, such as deep learning algorithms, ensemble methods (e.g., Random Forests, Gradient Boosting), or neural networks. These models have the potential to capture complex relationships in the data and improve prediction accuracy.

Incorporation of User Feedback Loop:

Developing a mechanism to capture and incorporate user feedback into the system can enhance the recommendation process.

REFERENCES

1.Reddy, S.; Allan, S.; Coghlan, S.; Cooper, P. A governance model for the application of AI in health care. J. Am. Med. Inform. Assoc. 2019, 27, 491–497. [CrossRef]

2. Lee, J.; Davari, H.; Singh, J.; Pandhare, V. Industrial Artificial Intelligence for industry 4.0-based manufacturing systems. Manuf. Lett. 2018, 18, 20–23. [CrossRef]

3. Langer, A. Analysis and Design of Next-Generation Software Architectures: 5G, IoT, Blockchain, and Quantum Computing; Springer International Publishing: New York, NY, USA, 2020.

4. Kokku, R.; Sundararajan, S.; Dey, P.; Sindhgatta, R.; Nitta, S.; Sengupta, B. Augmenting classrooms with AI for personalized education. In Proceedings of the 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Calgary, AB, Canada, 15–20 April 2018; pp. 6976–6980.

5. Maghsudi, S.; Lan, A.; Xu, J.; van Der Schaar, M. Personalized Education in the Artificial Intelligence Era: What to Expect Next. IEEE Signal Process. Mag. 2021, 38, 37–50. [CrossRef]

6. Pokrivˇcáková, S. Preparing teachers for the application of AI-powered technologies in foreign language education. J. Lang. Cult. Educ. 2019, 7, 135–153. [CrossRef]

7. Cone, L.; Brøgger, K.; Berghmans, M.; Decuypere, M.; Förschler, A.; Grimaldi, E.; Hartong, S.; Hillman, T.; Ideland, M.; Landri, P.; et al. Pandemic Acceleration: Covid-19 and the emergency digitalization of European education. Eur. Educ. Res. J. 2021. [CrossRef]Information 2022, 13, 203 24 of 26

8. Popenici, S.A.D.; Kerr, S. Exploring the impact of artificial intelligence on teaching and learning in higher education. Res. Pract. Technol. Enhanc. Learn. 2017, 12, 22. [CrossRef]

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9. VanLeeuwen, C.A.; Veletsianos, G.; Belikov, O.; Johnson, N. Institutional perspectives on faculty development for digital education in Canada. Can. J. Learn. Technol. 2020, 46, 2. [CrossRef]
10. Dillenbourg, P. The Evolution of Research on Digital Education. Int. J. Artif. Intell. Educ. 2016, 26, 544–560. [CrossRef]
11. Taglietti, D.; Landri, P.; Grimaldi, E. The big acceleration in digital education in Italy: The COVID-19 pandemic and the blended-school form. Eur. Educ. Res. J. 2021, 20, 423–441. [CrossRef]
12. Rajendran, R.; Kalidasan, A. Convergence of AI, ML, and DL for Enabling Smart Intelligence: Artificial Intelligence, Machine Learning, Deep Learning, Internet of Things. In Challenges and Opportunities for the Convergence of IoT, Big Data, and Cloud Computing; IGI Global: Hershey, PA, USA, 2021; pp. 180–195.
13. Murad, D.F.; Heryadi, Y.; Wijanarko, B.D.; Isa, S.M.; Budiharto, W. Recommendation system for smart LMS using machine learning: A literature review. In Proceedings of the 2018 International Conference on Computing, Engineering, and Design (ICCED), Bangkok, Thailand, 6–8 September 2018; pp. 113–118.
14. Sciarrone, F. Machine learning and learning analytics: Integrating data with learning. In Proceedings of the 2018 17th International Conference on Information Technology Based Higher Education and Training (ITHET), Olhao, Portugal, 26–28 April 2018; pp. 1–5.
15. Romero, C.; Ventura, S. Educational Data Mining: A Review of the State of the Art. IEEE Trans. Syst. Man, Cybern. Part C (Appl. Rev.) 2010, 40, 601–618. [CrossRef]
16. Romero, C.; Ventura, S. Data mining in education: Data mining in education. Wiley Interdiscip. Rev. Data Min. Knowl. Discov. 2013, 3, 12–27. [CrossRef]
17. Roll, I.; Wylie, R. Evolution and Revolution in Artificial Intelligence in Education. Int. J. Artif. Intell. Educ. 2016, 26, 582–599. [CrossRef]
18. Moubayed, A.; Injadat, M.; Nassif, A.; Lutfiyya, H.; Shami, A. E-Learning: Challenges and Research Opportunities Using Machine Learning Data Analytics. IEEE Access 2018, 6, 39117–39138. [CrossRef]
19. Chen, L.; Chen, P.; Lin, Z. Artificial Intelligence in Education: A Review. IEEE Access 2020, 8, 75264–75278. [CrossRef]
20. Guan, C.; Mou, J.; Jiang, Z. Artificial intelligence innovation in education: A twenty-year data-driven historical analysis. Int. J. Innov. Stud. 2020, 4, 134–147. [CrossRef]

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