Product Development

Students Performance Monitoring and Prediction

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Abstract

This project focuses on leveraging deep learning models to predict student dropout and graduation outcomes using a standard dataset comprising academic, demographic, and socio-economic variables. By employing advanced preprocessing techniques and feature selection methods, it optimizes the input data to uncover meaningful insights. The deep learning architectures, tailored to the complexities of educational data, yield accurate predictions surpassing traditional methods. Integrating various facets of student information, including academic performance and socio-economic backgrounds, the deep learning model offers a holistic understanding of student success. Beyond prediction, this study aims to find useful information that can help create specific ways to support students better, making sure everyone gets the help they need for success in education.

Background Information

The dataset, curated from disparate databases within a higher education institution, serves a pivotal purpose in addressing the pervasive issue of academic dropout and failure among undergraduate students. With a keen focus on leveraging deep learning methodologies, it endeavors to identify students at risk early in their academic journey, thereby enabling timely interventions and tailored support strategies. Each instance in the dataset encapsulates comprehensive information available at the onset of student enrollment, encompassing academic trajectories, demographic profiles, and socio-economic indicators. Formulated as a three-category classification task—dropout, enrolled, and graduate—reflecting the students' status at the culmination, the dataset offers a robust framework for predictive modeling. Moreover, with meticulous data preprocessing procedures addressing anomalies, outliers, and missing values, the dataset provides a reliable foundation for subsequent analyses and model development.

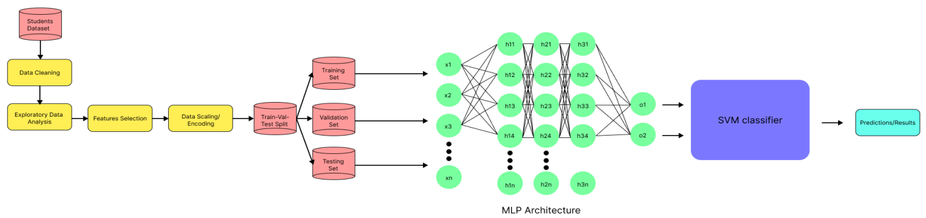
Results and Conclusion

The model architecture comprises three hidden layers respectively, each employing hyperbolic tangent activation and L2 regularization. Utilizing RMSprop optimizer and binary cross-entropy loss function, the model was trained with early stopping criteria based on validation loss. Subsequently, features extracted from the MLP model were employed to train a support vector machine (SVM) classifier using a linear kernel. The SVM model exhibited a Training Accuracy of 0.8553, Validation Accuracy of 0.83, and Test Accuracy of 0.82875. These results underscore the effectiveness of the MLP model in extracting meaningful features for subsequent classification tasks, as evidenced by the comparable performance of the SVM classifier.

Introduction

This project focuses on leveraging deep learning to tackle the issue of academic dropout and failure among undergraduate students in higher education institutions. By analyzing comprehensive data on students' academic paths, demographics, and socio-economic backgrounds, the goal is to develop predictive models that can identify students at risk of dropping out early in their academic journey. Through this initiative, the project aims to provide valuable insights and support strategies to help improve student retention rates and promote academic success.

Methodology/Architectural Design



MLP Architecture

References

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