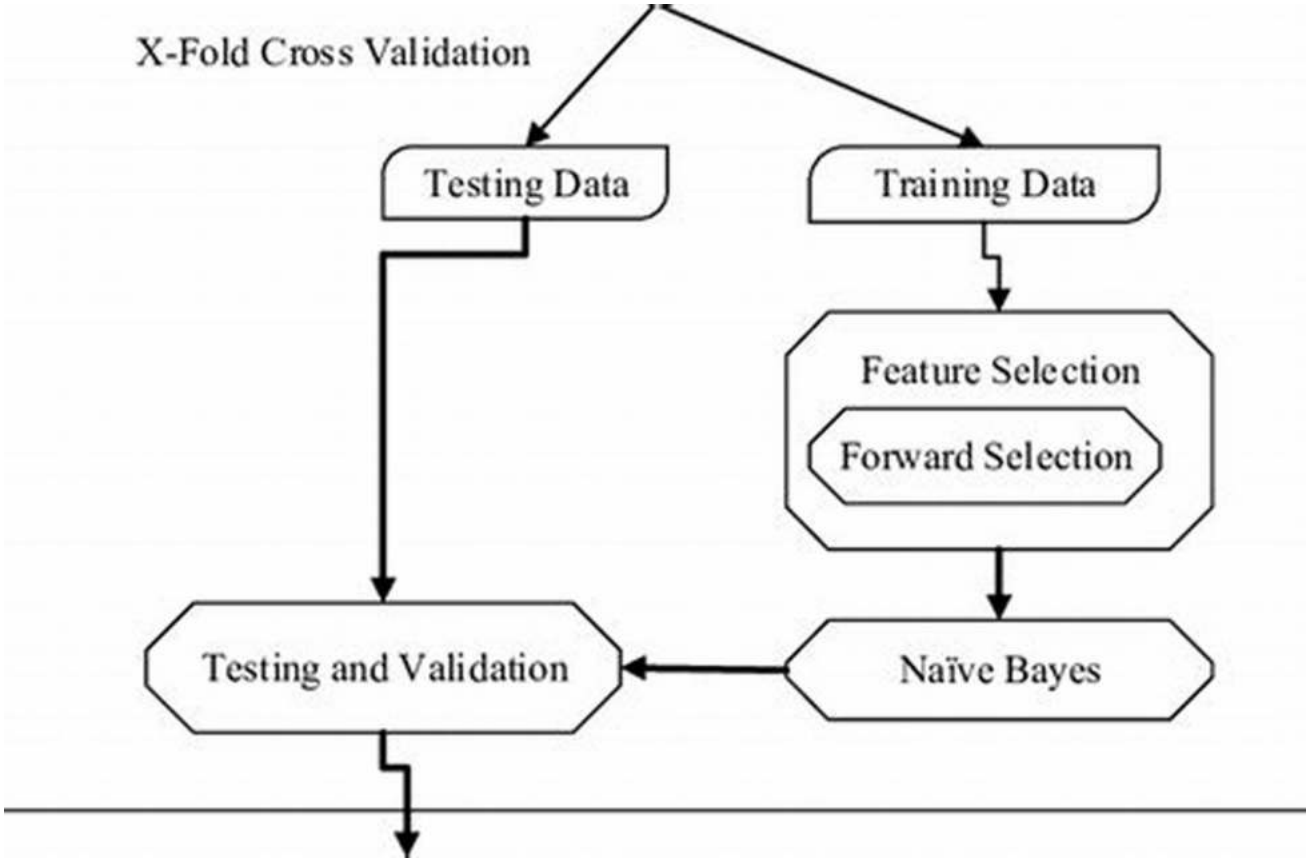
Higher Education Student Academic Performance Analysis And Prediction Using

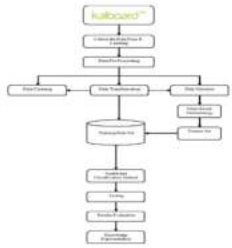


Higher education plays a crucial role in shaping the future of students. It not only provides them with knowledge but also equips them with the necessary skills to excel in their chosen careers. In recent years, there has been a growing interest in analyzing and predicting student academic performance using data-driven techniques. This article explores the use of such techniques in higher education to gain insights into student performance and improve educational practices.

The Importance of Student Academic Performance Analysis

Understanding student academic performance is crucial for educators and institutions to tailor their teaching methods and resources effectively. By analyzing

historical data, educators can identify patterns and trends that can help them identify struggling students at an early stage. This, in turn, allows for targeted interventions and support systems to be implemented, resulting in improved academic outcomes.



HIGHER EDUCATION STUDENT ACADEMIC PERFORMANCE ANALYSIS AND PREDICTION USING MACHINE LEARNING WITH PYTHON GUI

by Vivian Siahaan (Kindle Edition)

4.7 out of 5

Language	: English
File size	: 5371 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 294 pages
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Item Weight	: 10.9 ounces
Dimensions	: 6 x 0.47 x 9 inches

Moreover, analyzing student performance data can provide valuable insights into the effectiveness of different teaching approaches and curricula. It enables educators to identify areas of improvement, adjust their strategies, and continuously enhance the learning experience for students.

Data-Driven Approach to Student Academic Performance Analysis

A data-driven approach to student academic performance analysis involves utilizing various techniques and tools to analyze large datasets collected from

students. These datasets may include information such as grades, attendance records, demographic data, and even social media activity.

One common approach is to use predictive modeling techniques to forecast student performance based on historical data. By considering factors such as previous grades, attendance, and study habits, machine learning algorithms can generate predictions regarding the future academic performance of individual students. This information can be useful in identifying students who may be at risk of falling behind and implementing appropriate interventions.

Predicting Student Academic Performance

Predicting student academic performance is a complex task that requires the integration of multiple data sources and advanced analytical techniques. One popular method is the use of decision trees, which construct a flowchart-like model to predict outcomes based on a set of input variables.

Another approach is regression analysis, which aims to establish a relationship between the independent variables and the dependent variable (i.e., academic performance). By analyzing historical data, regression models can generate predictions regarding the impact of different factors on student performance.

Furthermore, machine learning algorithms such as artificial neural networks and support vector machines can also be used to predict student performance. These algorithms are capable of identifying complex relationships and patterns within the data, providing more accurate predictions.

The Benefits of Predictive Analytics in Education

The use of predictive analytics in higher education has several benefits. Firstly, it allows for the early identification of students who may be at risk of academic

underperformance. By intervening early, educators can provide personalized support and resources to help these students succeed.

Secondly, predictive analytics can help institutions allocate resources more effectively. By understanding the factors that influence student performance, educational institutions can optimize their resources and interventions to ensure maximum positive impact.

Finally, predictive analytics can uncover insights into the effectiveness of different teaching methods and curricula. By analyzing student performance data, educators can identify areas where improvements can be made and adjust their strategies accordingly.

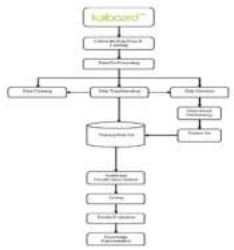
The Ethical Considerations

While the use of predictive analytics in higher education offers significant advantages, it also raises ethical concerns. The collection and analysis of student data must be done with utmost care to ensure privacy and maintain data security. Additionally, decisions based on predictive models should not discriminate against any student or reinforce existing biases.

It is essential for educational institutions to develop policies and guidelines to address these ethical considerations. Transparency and accountability in data collection and analysis are crucial to ensure that the benefits of predictive analytics are maximized while minimizing the potential harms.

Higher education student academic performance analysis and prediction using data-driven techniques offer immense potential for improving educational practices. By leveraging the power of advanced analytics and machine learning algorithms, educators can gain valuable insights into student performance, identify areas of improvement, and implement targeted interventions.

However, the ethical considerations associated with data collection and analysis must be addressed to ensure the privacy and well-being of students. With careful planning and adherence to ethical guidelines, predictive analytics can revolutionize higher education and help students achieve their full potential.



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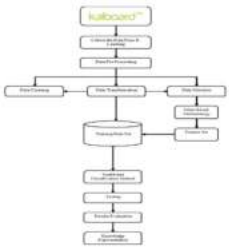
The dataset used in this project was collected from the Faculty of Engineering and Faculty of Educational Sciences students in 2019. The purpose is to predict students' end-of-term performances using ML techniques.

Attribute information in the dataset are as follows: Student ID; Student Age (1: 18-21, 2: 22-25, 3: above 26); Sex (1: female, 2: male); Graduated high-school type: (1: private, 2: state, 3: other); Scholarship type: (1: None, 2: 25%, 3: 50%, 4: 75%, 5: Full); Additional work: (1: Yes, 2: No); Regular artistic or sports activity: (1: Yes, 2: No); Do you have a partner: (1: Yes, 2: No); Total salary if available (1:

USD 135-200, 2: USD 201-270, 3: USD 271-340, 4: USD 341-410, 5: above 410); Transportation to the university: (1: Bus, 2: Private car/taxi, 3: bicycle, 4: Other); Accommodation type in Cyprus: (1: rental, 2: dormitory, 3: with family, 4: Other); Mother's education: (1: primary school, 2: secondary school, 3: high school, 4: university, 5: MSc., 6: Ph.D.); Father's education: (1: primary school, 2: secondary school, 3: high school, 4: university, 5: MSc., 6: Ph.D.); Number of sisters/brothers (if available): (1: 1, 2:, 2, 3: 3, 4: 4, 5: 5 or above); Parental status: (1: married, 2: divorced, 3: died - one of them or both); Mother's occupation: (1: retired, 2: housewife, 3: government officer, 4: private sector employee, 5: self-employment, 6: other); Father's occupation: (1: retired, 2: government officer, 3: private sector employee, 4: self-employment, 5: other); Weekly study hours: (1: None, 2: <5 hours, 3: 6-10 hours, 4: 11-20 hours, 5: more than 20 hours); Reading frequency (non-scientific books/journals): (1: None, 2: Sometimes, 3: Often); Reading frequency (scientific books/journals): (1: None, 2: Sometimes, 3: Often); Attendance to the seminars/conferences related to the department: (1: Yes, 2: No); Impact of your projects/activities on your success: (1: positive, 2: negative, 3: neutral); Attendance to classes (1: always, 2: sometimes, 3: never); Preparation to midterm exams 1: (1: alone, 2: with friends, 3: not applicable); Preparation to midterm exams 2: (1: closest date to the exam, 2: regularly during the semester, 3: never); Taking notes in classes: (1: never, 2: sometimes, 3: always); Listening in classes: (1: never, 2: sometimes, 3: always); Discussion improves my interest and success in the course: (1: never, 2: sometimes, 3: always); Flip-classroom: (1: not useful, 2: useful, 3: not applicable); Cumulative grade point average in the last semester (/4.00): (1: <2.00, 2: 2.00-2.49, 3: 2.50-2.99, 4: 3.00-3.49, 5: above 3.49); Expected Cumulative grade point average in the graduation (/4.00): (1: <2.00, 2: 2.00-2.49, 3: 2.50-2.99, 4: 3.00-3.49, 5: above 3.49); Course ID; and OUTPUT: Grade (0: Fail, 1: DD, 2: DC, 3: CC, 4: CB, 5: BB, 6: BA, 7: AA).

The models used in this project are K-Nearest Neighbor, Random Forest, Naive Bayes, Logistic Regression, Decision Tree, Support Vector Machine, Adaboost, LGBM classifier, Gradient Boosting, and XGB classifier. Three feature scaling used in machine learning are raw, minmax scaler, and standard scaler. Finally, you will develop a GUI using PyQt5 to plot cross validation score, predicted values versus true values, confusion matrix, learning curve, decision boundaries, performance of the model, scalability of the model, training loss, and training accuracy.



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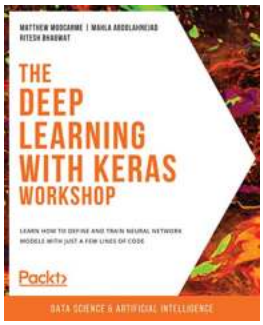

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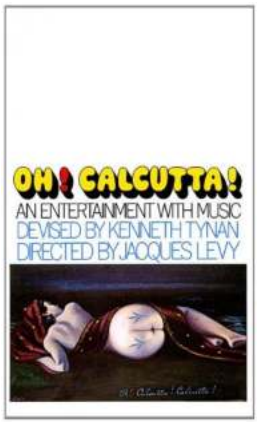

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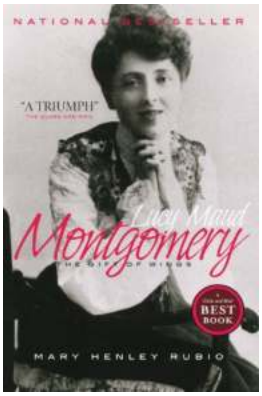

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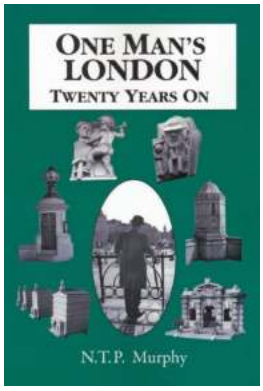

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