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Early Prediction on Students Performance

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Abstract: *Early indications regarding students' progress help academics to optimise their learning strategies and focus on diverse educational practices to make the learning experience success- fully. Machine learning application can help academics to predict the expected weaknesses in learning processes and as a result they can proactively engage such students in better learning experience. We applied logistic regression, linear discriminant analysis, K-nearest neighbors, classification and regression trees, gaussian Naive Bayes and support vector machines on historical data of student grades in one of the undergraduate courses and developed a model to predict the grades of students taking the same course in the next term . Our experiments show Linear discrimination analysis as the most effective approach to correctly predict the students' performance outcome in final exams. Out of total 54 records, 49 were predicted by model as expected giving 90.74*

Keywords: SVM, computer vision, neural networks. Machine Learning, Predictive Analytics, Forecasting Student Performance, Linear Discriminant Analysis

I. INTRODUCTION

A report prepared by the Central Council for Education in 2008, titled "Toward building bachelor degree education clarified that teaching management and professional faculty and staff development were subject to three policies (i.e., those involved in awarding degrees, curriculum implementation and organization, and student enrollment) [1]. After this report, scientific thinking styles involving statistical data and "evidence-based" research gradually came to be required at the university level.

Student's performance at university level for various courses has been evaluated by many researcher in Malaysia. Most of the researchers used CGPA as a key performance index to analyse student's academic performance. There are several factors have been considered to give a significant effect on student's academic achievement. Studies conducted in [3–5] presented the influence of ethnic and gender in academic performance at university level. Findings in [6] showed the environment factors including student's accommodation during their study, relationship status and other surrounding supports has remarkable relation towards student's performance in engineering studies. Additional study presented in [7] highlighted factors that contribute

II. RELATED WORK

A Robust Performance Degradation Modeling Approach Based on Student's t-HMM and Nuisance Attribute Projection

AUTHORS:HUIMING JIANG 1 , JING YUAN 1 , QIAN ZHAO 1 , HAN YAN 2 , SEN WANG3 , AND YUNFEI SHAO

a robust performance degradation modeling approach designed to predict and understand the factors influencing student performance in educational settings. Specifically, it utilizes a combination of **Student's t-distribution Hidden Markov Models (t-HMM)** and **Nuisance Attribute Projection (NAP)**. The integration of these two methodologies enables the model to account for the inherent uncertainty and variability in student data while mitigating the effects of irrelevant or nuisance factors that may skew predictions. The approach is intended to offer a more accurate, dynamic model of student performance over time, especially in cases where data distributions are heavy-tailed, and underlying noise is present..

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Using Machine Learning Techniques to Earlier Predict Student's Performance

AUTHORS:EvawatyTanuar; Yaya Heryadi; Lukas; Bahtiar Saleh Abbas; Ford LumbanGaol

The techniques used in this experiment are Generalized Linear Model, Deep Learning and Decision Tree.This evaluation has had many difficulties, as it is by and large wide, not zeroed in on the utilization of understudy input as a benchmark for understudy execution, experienced quality issues, and has not been distributed in the most as often as possible posed inquiriespaper proposes .

Data Mining Analysis on Student's Academic Performance through Exploration of Student's Background and Social Activities

AUTHORS:Ching-Chieh Kiu

Student Performance, Educational Data Mining, Decision Tree, Naïve Bayesian, Neural Networka powerful technique that allows educators and institutions to explore large datasets and uncover hidden patterns, relationships, and insights that can help predict and improve student academic performance. By analyzing various factors such as a student's background (socioeconomic status, family education, etc.) and social activities (extracurricular involvement, peer relationships, etc.), data mining can offer valuable predictions and interventions to enhance learning outcomes. Below is an exploration of how data mining can be applied to analyze student performance by considering both academic and non-academic facto.

Learning and academic success in engineering courses: Comparing 1st year students according to gender

AUTHORS:Vasconcelos, Rosa M. President of Pedagogical Council of the School of Engineering of University of Minho Guimarães, Portugal rosa@det.uminho.pt

Keywords— Higher Education; academic expectations; engineering students; learning outcomes; academic success; genderThe issue of gender differences in academic performance has been a subject of extensive research across various disciplines, including engineering. Engineering programs are often perceived as challenging, with high expectations for technical expertise, problem-solving, and academic rigor. Within this context, gender differences in learning styles, performance, and engagement in 1st-year engineering courses can provide valuable insights for educators and policymakers striving to create more inclusive and effective learning environments.

This study aims to compare the academic success of 1st-year engineering students based on gender, exploring potential factors that may influence their performance. This includes examining differences in academic outcomes, study habits, motivation, participation in class, and overall engagement

Measuring Commuter Student Support and Success through Academic Integration

AUTHORS: Cory Brozina

Commuter students, who do not live on campus and commute from home to attend classes, face unique challenges in their academic journey compared to residential students. These challenges include limited access to campus resources, fewer opportunities for peer interaction, and potential feelings of isolation. Despite these challenges, commuter students can succeed academically if they are properly supported through intentional academic integration strategies that help them engage with their studies, peers, and the academic community.

This paper explores how to measure the success and support of commuter students by focusing on **academic integration**, a concept that refers to how well students connect with the academic community and engage with the academic experience, including faculty, coursework, and peer relationships. Understanding the relationship between academic integration and commuter student success can guide the development of targeted interventions and programs aimed at improving retention, engagement, and overall academic performance.

III. SYSTEM ARCHITECTURE AND PROPOSED SYSTEM

Proposed System

This paper presents a comprehensive assessment based on a real prototype implementation and performance evaluation. In our configuration, an edge server serves a dual purpose: acting as the administrative controller of the IoT infrastructure while also meeting the application's latency and privacy requirements. We illustrate the effectiveness of

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this architecture through the independent implementation of various micro services, which are then interconnected to form an IoT application. Additionally, we explore the potential for sharing these micro services across different IoT applications operating concurrently to improve interoperability. Ultimately, we conduct an in-depth performance analysis that emphasizes application latency, as well as CPU and memory usage.

We operate under the assumption that the data owner is trustworthy and that data users have been authorized by the owner. The communication channels between the owner and users are secured using established security protocols such as SSL and TLS. Concerning the cloud server, our approach addresses a more complex security model that goes beyond the ”semi- honest server” framework typically employed in other secure semantic search schemes. In our model, a dishonest cloud server may attempt to provide incorrect or fabricated search results and gain access to sensitive information, but it will not engage in malicious activities such as deleting or altering the outsourced documents. Consequently, our secure semantic scheme is designed to ensure verifiability and confidentiality within this security framework.

1.User: In this module we design the windows for the project. These windows are used for secure login for all users. To connect with server user must give their username and password then only they can able to connect the server. If the user already exits directly can login into the server else user must register their details such as username, password and Email id, into the server. Server will create the account for the entire user to maintain upload and download rate. Name will be set as user id. Logging in is usually used to enter a specific page

2.Pre processing: This is the first module Data User can register and Login. After login Data User have an option of searching the files as a file name. Data user can also have a download file it will show an encrypted data. Data user can also send a trapdoor request to the server. Server can accept the request and then data user can takes permissions from the owner then the file it will downloaded in plain text

3.Classifier : This is the Second module of this project. In this module Data Owner should register and Login. Data Owner will Uploads the files into the database. Data owner can also send request to the data user.

4.Training Data : This is the third module of this project. In this module Cloud Server can login. After login it will see all data owners’ information. Cloud server can see all users’ information. Cloud server can see an all stored data files. Cloud server can give keys request to the user. Cloud server can also see an attacker information of file.

Hardware Requirements

Processor : Pentium-IV
RAM :512 MB(min)
Hard Disk : 40 GB
Key Board : Standard Windows Keyboard
Mouse : Two or Three Button Mouse
Monitor : LCD/LED

Software Requirements

IDE : Spyder
Coding Language :Python Version 3.8
Operating System :Windows 10

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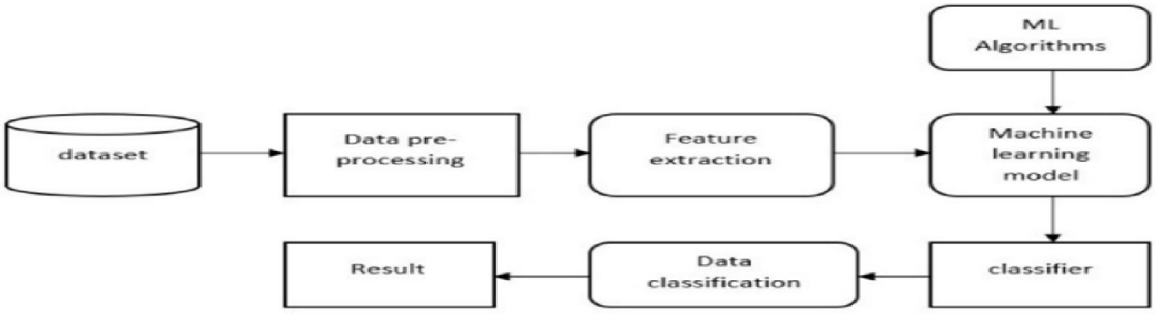
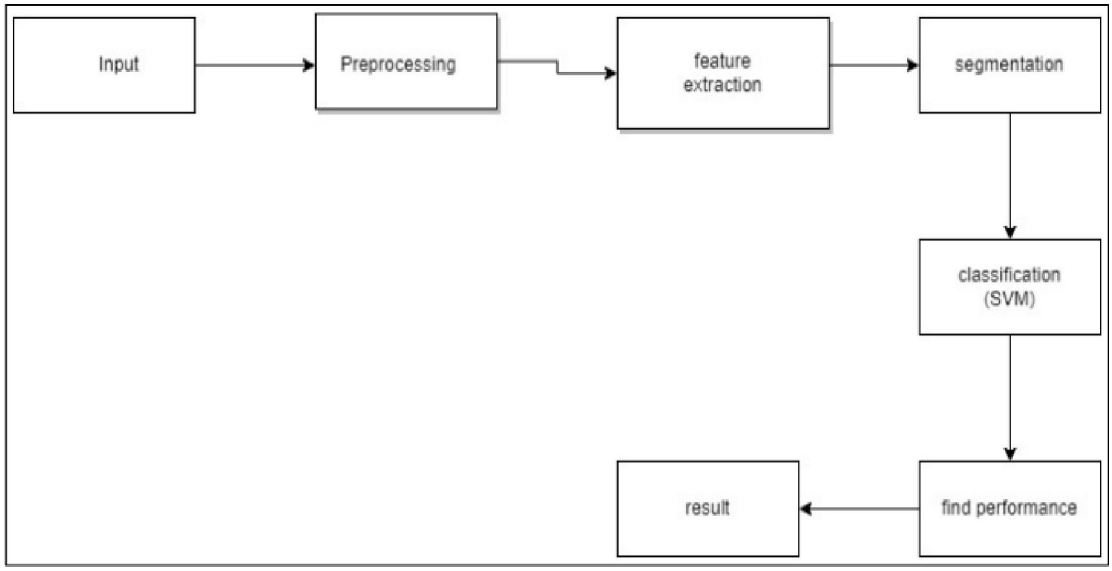
System Architecture:



Data Flow Diagram



IV. ADVANTAGES AND DISADVANTAGES

Advantages

- Timely Interventions
- Improved Learning Outcomes
- Better Resource Allocation
- Improved Retention Rates
- Data-Driven Decision Making

Disadvantages

- Over-reliance on Data and Algorithms
- Stigmatization and Labeling
- Pressure and Anxiety for Students
- Privacy and Ethical Concerns

V. CONCLUSION

The conducted study was intended to examine the influence factors in student's academic performance in FKE, Shah Alam. Three factors including geographic background, mathematics grades in SPM level and psychographics characteristic had been studied. CGPA has been used as a key performance index of student's performance. The result

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found no strong relation between mathematics and additional mathematics grades in SPM with student's performance in engineering course. However, the data obtained showed students from town area achieved better CGPA as compared to students from rural area

VI. FUTURE WORK

In the future, we aim to leverage deep learning architectures to enhance prediction capabilities and overall performance. This approach allows for the integration of both non-academic and academic features. Improving the early prediction of student performance in higher education. requires several essential strategies. First, by adding diverse data sources such as extracurricular activities and personal interests, institutions can develop a more holistic view of each student's profile, resulting in more precise predictions. Second, implementing real-time monitoring and feedback mechanisms allows educators to act swiftly when they detect signs of academic difficulties, thereby preventing problems from worsening and enriching the learning experience for students. Additionally, integrating predictive models with current learning management systems simplifies data analysis and promotes effective communication between predictive analytics and educators. Furthermore, using predictive analytics, personalized learning pathways can be crafted to align with each student's unique strengths and weaknesses, thereby enhancing student engagement and success. Collaboration among educational institutions and researchers is vital for sharing knowledge and advancing the field of predictive analytics in higher education.

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