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A Study of Use of Machine Learning in Assessment of Student Academic Performance in Professional Education

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ABSTRACT

Assessment of student performance in professional education is influenced by various factors, including pedagogical approaches, student characteristics, institutional policies, assessment methods, and external influences. This literature review examines these key determinants, emphasizing the role of evolving assessment techniques in improving student learning outcomes. Pedagogical methods such as problem-based learning and blended learning significantly impact assessment effectiveness. Additionally, student motivation, learning styles, and cognitive abilities contribute to performance variations. Institutional frameworks, including standardized assessments and competency-based evaluations, shape assessment reliability. Moreover, technological advancements and industry expectations introduce new challenges and opportunities in evaluating student competencies. Despite ongoing improvements, challenges such as subjectivity in grading and academic integrity concerns persist. Future research should focus on developing standardized, adaptive, and competency-driven assessment frameworks to enhance reliability and fairness in student evaluations. By addressing these factors, educators can optimize assessment strategies to ensure students' professional readiness and academic success.

Keywords: Machine Learning, Student assessment, Supervised Learning

INTRODUCTION

The primary function of education system to assess the learning of an individual to achieve the goals. The assessment and evaluation of academic quality of a student is a crucial aspect of higher education and technical education, ensuring that students achieve their learning objectives and institutions maintain their standards.

A traditional method in evaluation of academic performance of student depends on student's attendance, examination grades and subject marks which may not judge the academic quality of students.

The students of post graduate professional programs like MCA should have good academic record, good technical skill, presentation skill, good communication and aptitude skill should have knowledge about current market job requirements, extra curriculum activities like professional certifications.

The soft skills includes communication skills that includes clear and concise communication both verbally and in writing to effectively interact with clients and team members, problem-solving skill includes analytical thinking and ability to break down complex problems into manageable steps, adaptability skill includes willingness to learn new technologies and adapt to changing industry trends.

The key points to be taken into account while preparing for IT company placements as a MCA student such as strong technical skills in programming languages like core Java, advanced java, Python, database management, web development, a good understanding of SDLC, problem-solving abilities, communication skills, to adopt and learn new technologies, and academic projects.

Assessment of student's performance has been performed at various levels in his/her academic career such as in a tutor system level to evaluate whether some specific knowledge or skills student is having.

Machine learning (ML) offers powerful tools to analyze complex educational datasets and uncover insights that are not easily visible through traditional methods. Machine Learning (ML) has emerged as a powerful tool to analyze complex patterns in educational data, offering the potential to predict

academic outcomes and identify students' performance in various areas. This research aims to develop a machine learning-based model for assessing academic performance among MCA (Master of Computer Applications) students.

LITERATURE REVIEW

[1] Baker, R. S., & Inventado, P. S. (2014). Studies indicate that ML models can assess various academic indicators, such as attendance records, assignment scores, and participation levels, to forecast student performance with high accuracy (Baker & Inventado, 2014).

[2] Romero, C., & Ventura, S. (2020).Algorithms such as Decision Trees, Support Vector Machines (SVM), and Neural Networks have demonstrated effectiveness in identifying at-risk students and providing targeted interventions (Romero & Ventura, 2020).

[3] Shukla, M. (2023).In this research paper, institution of higher education should monitor its performance both absolutely and relatively by establishing and effectively running Internal Quality Assurance Cell and conducting annual academic and administrative audit by external agencies.

[4] Chitnis, R.,(2020).This research paper focus on f impact of Information and communication technology on student's assessment at school level & Integration of ICT in school assessments.

[5] Phukan, R. (2022). This research paper focus on Ensuring quality is a primary concern for higher education institutions (HEIs), especially in India. UGC promotes a quality culture in administrative and non-administrative activities. Internal Quality Assurance Cells.

NEED OF THE STUDY

The assessment of student performance in professional education is critical for ensuring the effectiveness of teaching and learning processes. It needs to determine the primary factors affecting student assessment in professional education which includes teaching strategies, assessment methods, student motivation, and institutional support.

OBJECTIVES OF THE STUDY

1) To understand level of academic performance of the students pursuing professional course.

2) To identify the key factors in students' academic performance.

3) To assess the academic performance levels of students enrolled in professional courses.

Factors That Influence Assessment of a Student Performance

There are various factors that influence assessment of student performance includes the following factors:-

1) Instructional methods in education include the various approaches teachers use to deliver learning content in a classroom.

2) Collaborative learning is a teaching methodology in which students working together in groups to solve the various problems, complete the tasks and try to learn new concept.

3) Problem-based learning (PBL) is a part of student-centered teaching method in which students work in groups to solve the problem. The aim of the PBL method is to help students develop creative skills for solving real-world problems.

4) Active learning involves students actively participate in the learning process. This method is based on the idea where people learn by new ideas to what they already know.

5) Game-based learning (GBL) is a very interesting teaching method which is based on games to make learning more funny and engaging. It can be digital or non-digital games.

6) Experiential learning involves student will gain knowledge and skills through direct experience. It is a learning process of transforming experiences into knowledge.

By understanding these factors is essential for improving academic performance this study is needed to:

1. **Identify Key Influences** – Determine the primary factors affecting student assessment in professional education, such as teaching strategies, assessment methods, student motivation, and institutional support.

2. **Improve Assessment Practices** – Provide observations into how educators can develop more effective, fair, and comprehensive assessment techniques.

3. **Improve Student Performance** – Offer recommendations on how students can optimize their learning experience to achieve better academic results.

4. **Address Challenges in Education** – Recognize and mitigate potential barriers to accurate student assessment, such as resource limitations, and personal challenges.

UNDERSTANDING THE BASICS OF MACHINE LEARNING IN EDUCATION

Now a day Machine Learning (ML) is mostly used in education sector for assessment of student academic performance. It is also transforming the professional education sector by enabling personalized learning, personalized monitoring data-driven insights and helps in automatic assessment. ML allows computers to analyze patterns, learn from data, and make predictions and helps in taking the decisions for the students.

Use of Machine Learning in Education

Machine learning (ML) is transforming education by personalize the learning experiences and enhancing student engagement in the education. ML can be applied in four ways in the education area such as grading the students, improving student engagement, assessment of student performance, and testing students. ML algorithms analyze student data based on individual strengths and weaknesses. Natural Language Processing (NLP) models assess essays and provide feedback on grammar related query. ML is transforming education by making learning more personalized, efficient, and accessible. While challenges exist, continued advancements in AI and ML will further enhance the learning experience, benefiting students and institutions also.

1. **Supervised Learning**

Supervised Learning is a type of Machine Learning (ML) which plays an important role in assessment of student performance. ML analyzes the labeled data and makes predictions based on historical trends. In it, the training model learns from past student data and apply that knowledge to evaluate current and future academic outcomes. It includes predicting student grades based on attendance, past scores, and participation.

2. **Unsupervised Learning**

In unsupervised Learning, the system identifies patterns in unlabeled data without predefined categories that is grouping students based on learning styles.

Unsupervised Learning is also a branch of ML which helps in assessing student performance by identifying hidden patterns, various trends and relationships in educational data without labeled outputs.

Unsupervised Learning does not rely on predefined categories. It discovers meaningful groups and irregularity in student behavior and performance.

3. **Reinforcement Learning**

Reinforcement Learning (RL) is a type of ML which helps in assessment of student performance by enabling adaptive learning environments, optimize the teaching strategy and provide the real-time feedback to the teachers. It operates through trial and error, where an AI system learns from rewards and penalties to improve decision-making over time.

CONCLUSION

The use of Machine Learning (ML) in assessing student academic performance in professional education offers significant advantages by improving evaluation accuracy, personalization, and predictive capabilities. Traditional assessment methods, which rely on attendance, exam scores, and subjective evaluations, often fail to capture the complete academic and professional readiness of students. ML-driven approaches, including Supervised Learning, Unsupervised Learning, and Reinforcement Learning, provide data-driven insights that enhance assessment effectiveness.

Supervised Learning aids in predicting student performance based on historical data, while Unsupervised Learning helps identify hidden patterns and categorize students based on learning styles and behaviors. Reinforcement Learning optimizes the learning process through adaptive strategies, ensuring students receive personalized support and real-time feedback.

Moreover, various pedagogical approaches such as problem-based learning, active learning, and game-based learning significantly impact student assessment. Institutional policies, technological advancements, and industry expectations further shape the assessment process. However, challenges such as grading subjectivity, academic integrity concerns, and the need for standardized frameworks persist.

To enhance student assessment in professional education, future research should focus on developing standardized, adaptive, and competency-driven ML models that ensure fairness, reliability, and effectiveness. By integrating ML in education, institutions can improve assessment practices, support students in achieving better academic outcomes, and prepare them for industry demands. Ultimately, ML-powered assessment strategies will contribute to a more accurate, efficient, and student-centered evaluation system, ensuring professional readiness and academic success.

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