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Student Performance Prediction

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Abstract: ***Academic integration is now defined by how students are able to access, and effectively interact with, and are supported by engineering faculty and staff; Academic integration, which is a very important construct that contributes to a student's persistence and ultimate graduation. But, several factors, either numeric or non-numeric can have varying degrees of influence on academic performance of students. Rankings of aforementioned factors, hopefully, will assist the management in order to initiate corrective action with a view to students' academic performance improvement. In an academic environment, teachers are frequently in close contact with students and therefore their belief about the degree of influence of factors on students' academic performance could be of vital significance. The case study presented in this paper uses fuzzy relational calculus and the Dempster Shafer theory of evidence to examine and suggest a feasible and realistic ranking approach of only chosen factors!***

Keywords: Academic integration, numeric factors , non-numeric factors, Dempster Shafer theory ,fuzzy relational calculus

I. INTRODUCTION

Student Performance Prediction is to offer insightful information to educators, administrators, and policymakers so they can enhance the educational process and better meet the requirements of individual students. Academic institutions can better fulfill the different needs of their students by identifying pupils who may be at danger of falling behind or succeeding. This area of study is especially important now since educational institutions have to deal with a lot of issues, such as growing class sizes, scarce resources, and the need to adjust quickly to changing learning environments. These problems can be solved with the help of student performance prediction, which makes data-driven decisions, individualized learning programs, and proactive interventions possible.
We have created a system in our study to forecast college success for students.
We are examining their academic performance in order to do this. We take into account variables such as their entrance scores, first course grades, academic achievement test results, general aptitude test results, and information from students who were previously matched with valuable packages. Our research is novel in that we forecast a student's performance early on by analyzing all of these variables, including entrance scores and first-level course scores, using the SVM machine learning method.
This strategy is highly original and has never been used before. We're also investigating a novel approach to determining when to advance a pupil to a higher educational level. To accomplish this, we compute the difference between a student's current grade and the grade that was received either earlier or later.
We are utilizing sophisticated categorization models to evaluate the performance of our methods. The objective is to enhance our capacity to forecast college performance of pupils by employing these novel and inventive methods.

II. OBJECTIVES

To forecast that student performance is a complex goal with multiple applications in learning environments and other contexts.
Recognizing pupils who may struggle academically enables teachers to take early action and set up the required support networks.
Examining historical student performance data might help identify areas in which the curriculum may need to be improved.
Students themselves can get important insights from predictive models, which can help them recognize their own advantages and disadvantages.
To make use of data-driven insights in order to boost student success, improve outcomes, and improve the educational experience overall.

III. LITERATURE SURVEY

Functional Assessment (PDA) is necessary to ensure the safety of machinery and equipment. In PDA, the strength of the training model is the main issue that directly affects assessment performance and limits validity. This paper presents a modeling strategy based on Disturbance Attribute Projection (NAP) and Student's t-Hidden Markov Model (Student's t-HMM). The results show how reliable and effective the proposed method is for PDA modeling of roller bearings. [1]

Using data from our previous study, this article explores the factors that influence students' decisions to attend or drop out of South African universities. Previous studies have used high school grades as a measure of student achievement. The quality of the high school learning environment affects nearly every aspect of college success. No matter who they are, how much money they have, or where they go, students who graduate from high school with better skills are more likely to succeed in college. [2]

To help increase the dropout rate in South African universities, in this study we aim to provide information to solve the problems of abundant quality data on student performance. One of the most important issues in higher education is the loss of first-year students. Given the high attrition rate in college, more research is needed in the field of student career counseling. Recent advances in data analysis and big data processing have made it possible to develop effective predictive models. [3]

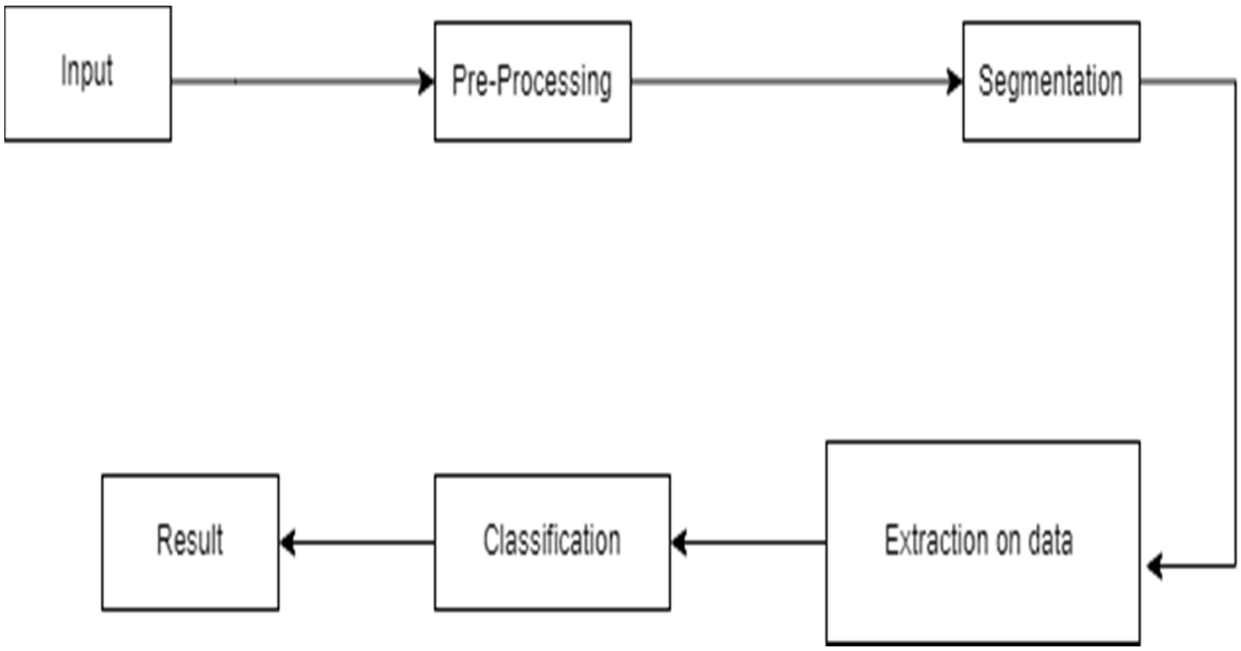
Higher education is very important in this dynamic and complex world. Due to advances in information technology, the literature on predicting student success at graduation or graduation has grown. Computer science degrees in particular are in high demand. Despite the increase in enrollment, there are still not enough graduates to meet society's employment demand. This research offers ideas that not only predict student performance or dropout risk, but also provide support to students and schools that can help solve the problem. [4]

This paper presents a multi-objective evolutionary algorithm that automatically selects appropriate key descriptors and generates multiple predictions based on machine learning to predict learning outcomes. Model models can be used to teach students. Based on mathematical experiments using real student data, predictive models can be developed that consider the balance between predictive performance and interpretive models. [5]

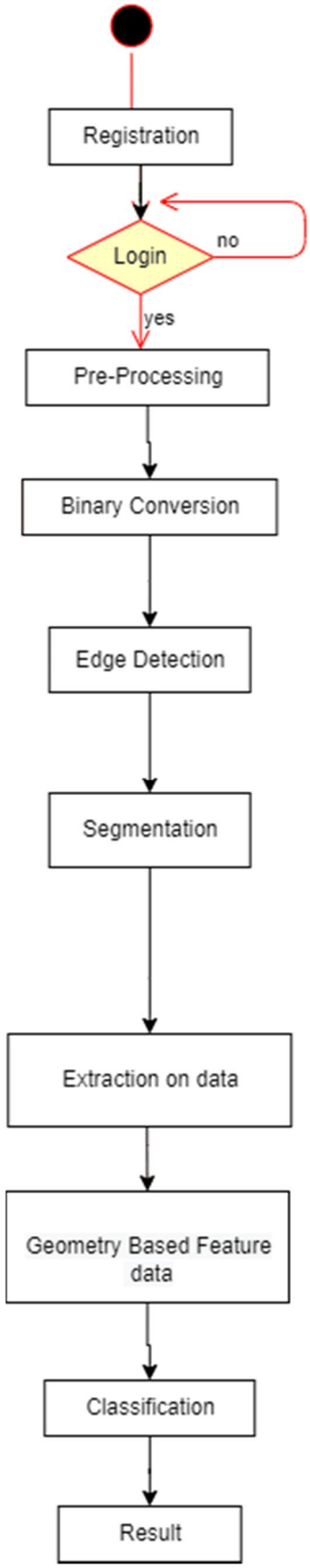
A survey was conducted to understand what changes affect students' learning in electrical engineering when they perform well in secondary school mathematics. Students' motivation to take engineering courses and their regional background also have an impact on their academic success. The survey was distributed to 82 students studying electrical engineering at Universiti Teknologi MARA (UITM), Shah Alam. Students' grade point average (CGPA) is used to measure their performance in engineering courses. The results showed that urban students performed better than rural students. At the same time, there is no significant relationship between students' engineering and mathematics status at school. [6]

Learning skills, or how well the student meets the requirements set by the institution's rules and regulations and/or state education plans, is the standard by which schools determine their success. This article presents a new method for performance evaluation using fuzzy logic systems. In our approach, we consider three things from a study with three tests: Test 1, Test 2 and Test 3. evaluation method. The results of our methodology in relation to some world standards demonstrate the effectiveness of our approach to evaluating university performance. [7]

IV. IMPLEMENTATION DETAILS



Data Flow Diagram



State Diagram

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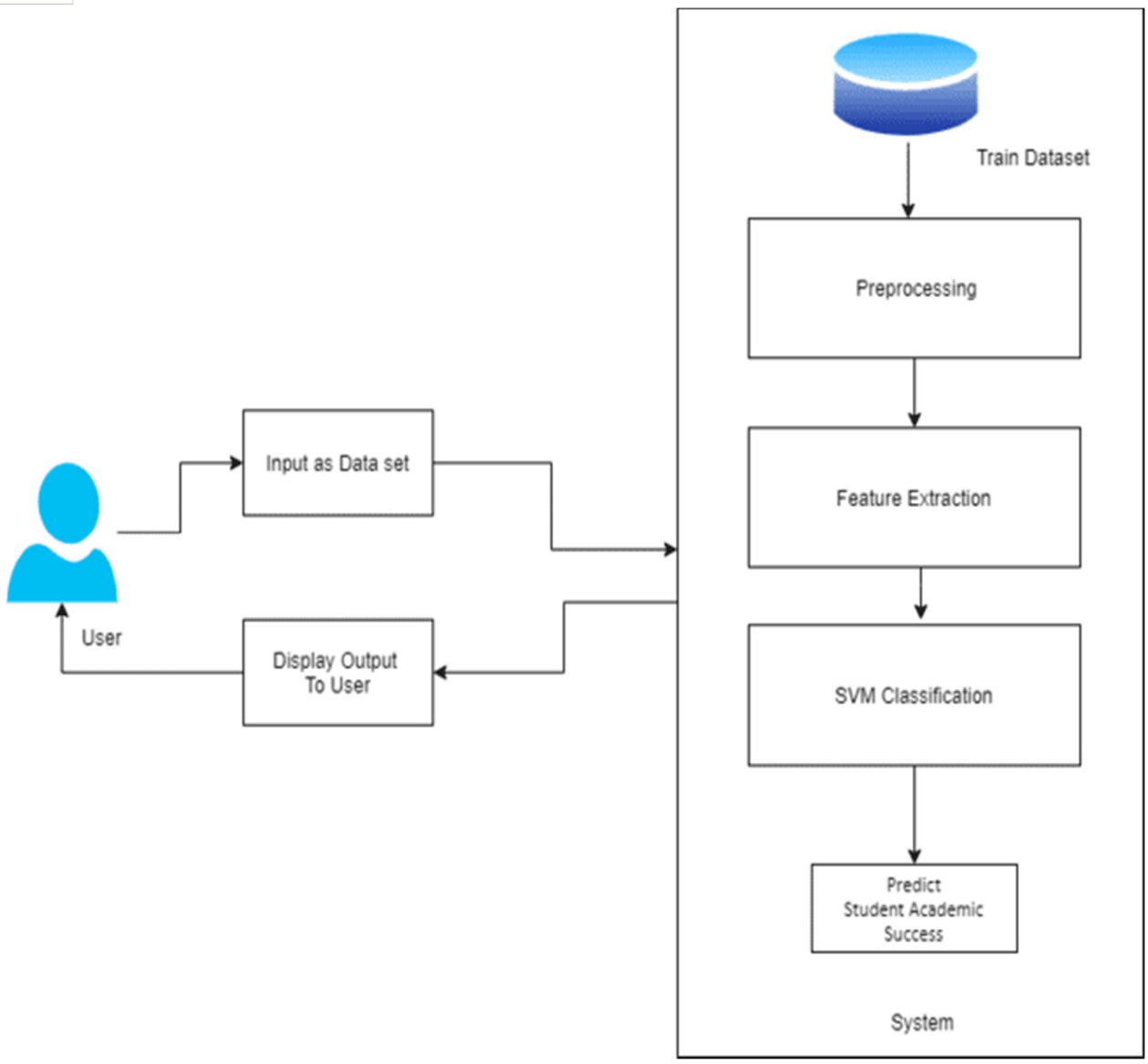


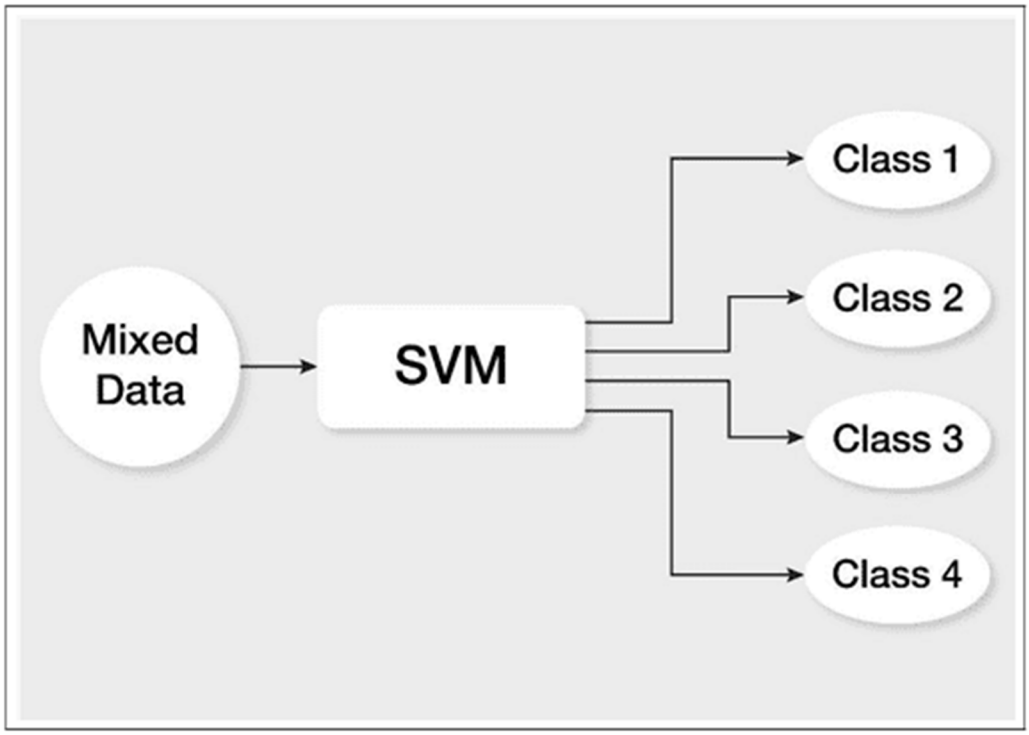
System Architecture

V. IMPLEMENTATION DETAILS OF MODULES

Forecasting student performance has become a pressing need in the majority of educational institutions. Helping at-risk students and ensuring their retention, offering top-notch learning materials and experiences, and enhancing the university's standing and reputation all depend on it. For beginning to mid-sized universities, that could be challenging to accomplish, particularly if they specialize in graduate and postgraduate programs and have tiny student records for analysis. Therefore, the primary goal of this research is to demonstrate that it is feasible to train and model a tiny dataset and to develop a prediction model with a reliable accuracy rate.

TOOLS AND TECHNOLOGIES USED :- Utilize image processing libraries or software tools such as OpenCV, IDE-Spyder, SQLlite & Python Library.

ALGORITHM :- Support Vector Machines (SVM) can indeed be used for predicting student performance based on various input features. This may involve normalization, standardization, encoding categorical variables, and feature scaling to ensure that all features contribute equally to the model. Identify relevant features that are likely to have a significant impact on student performance. Continuously monitor its performance and update it as needed with new data or improvements.



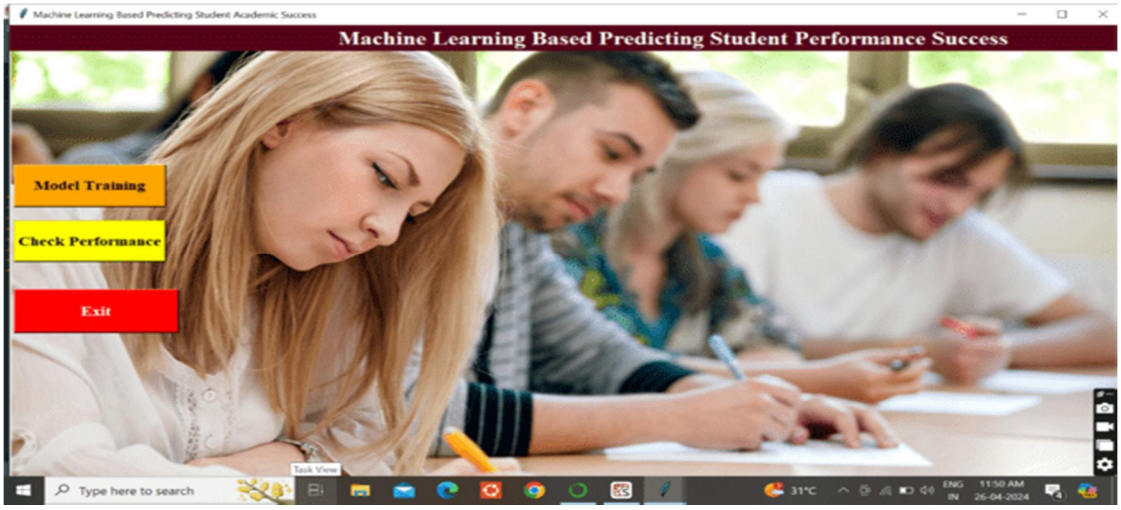
SVM Algorithm

1) Compile all necessary information, such as attendance records, academic records, behavioral data, and any other relevant information.
2) Determine which characteristics (variables) are most important in influencing student success, and if necessary, develop new features.
3) Select suitable machine learning algorithms (such as clustering, regression, and classification) and use historical data to train models.
4) For real-time data analysis, integrate machine learning models with the current SPMS infrastructure.
5) Put in place systems for data analysis and prediction in real-time, giving administrators and teachers immediate feedback.
6) Keep an eye on the model's performance at all times and assess its recall, accuracy, and precision, among other pertinent metrics.

VI. METHODOLOGY & RESULT

Predicting student performance is a multi-faceted task that often involves various data sources and methodologies. Gathering data from various sources such as student demographics, previous academic performance, attendance records, socio-economic background, behavioral data, and any other relevant information. Then splits the data into training and testing sets to evaluate the model's performance. Then understands the factors that contribute most to student performance by analyzing important feature or coefficients in the model. Ensure that the use of predictive models in education respects privacy, avoids discrimination, and is transparent to stakeholders like students, parents, and educators.

The outcome of student performance prediction can vary depending on the specific goals and context of the prediction task. Predictions of individual student performance can provide insights into which students are at risk of academic underachievement or dropout. The Analysis of predicted student performance across different demographics, grade levels, or subject areas can reveal broader trends and patterns. The predictions of student performance can inform decisions about resource allocation within educational institutions. The student performance prediction should be to support student's success and improve educational outcomes for all students by providing actionable insights and targeted interventions.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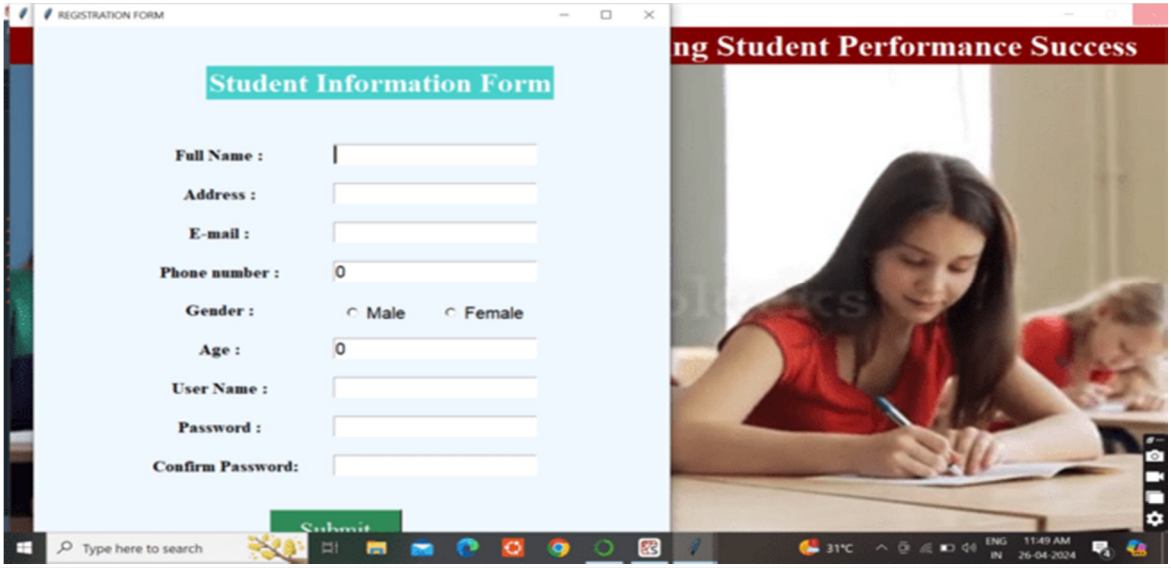
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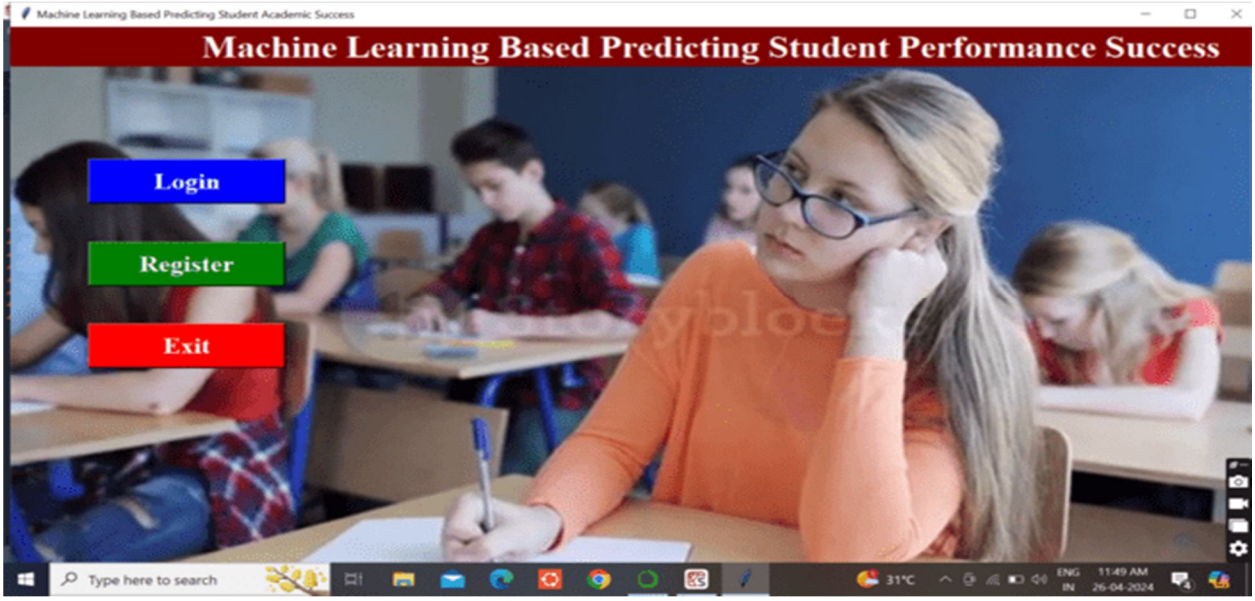
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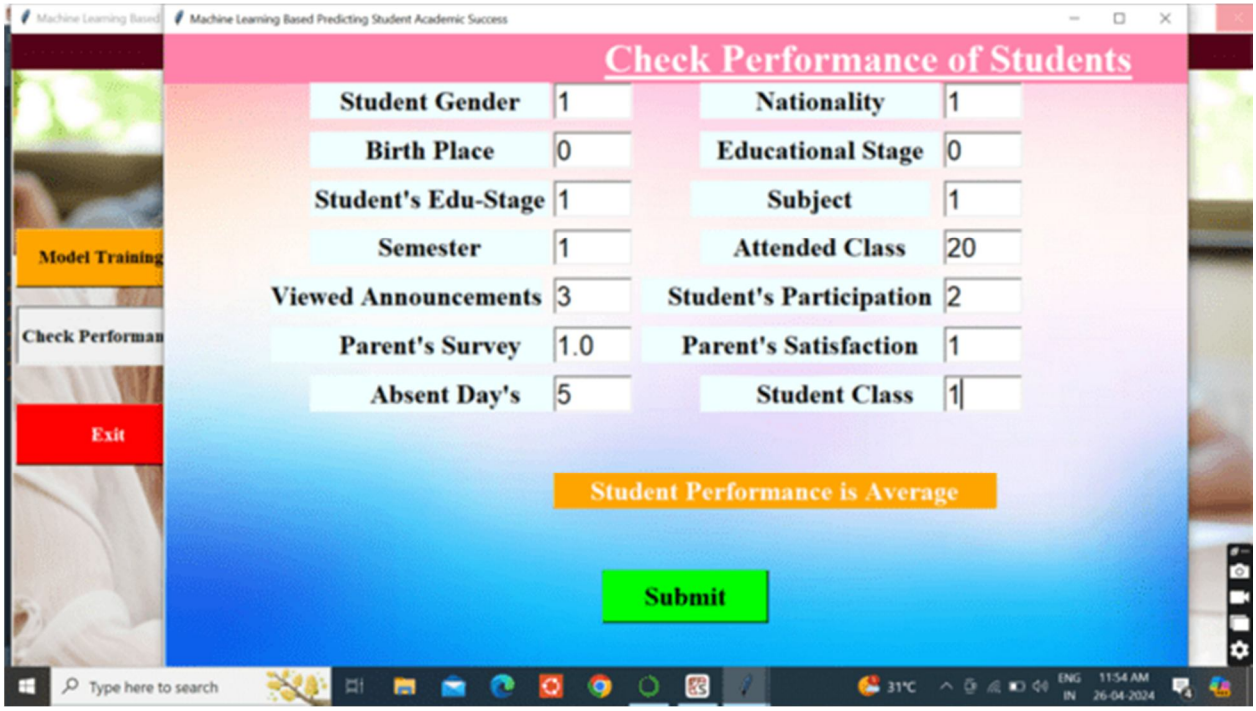

VII. CONCLUSION & FUTURE SCOPE

This research focused on the predictive ability of DM methods to predict students' achievement after preparatory year at the degree level in higher education. The students' achievement is based on the Grade Point Average (CGPA) defined as (high, average, or under average). Throughout the experiment, we have implemented three SVM classifiers on the student dataset to predict the achievement of the student at graduation year. Moreover, the important features that had a significant impact on predicting academic achievement of CS & IT students were CGPA for Prep year, Computer Skills course, Communication Skills course, Mathematics course. By giving students timely warnings, the results will assist predict students' final achievement early enough for them to adopt effective countermeasures. Thus, by offering the appropriate counseling, the proportion of pupils with low achievement can be decreased.

The prediction of student performance is a valuable application of data analytics and machine learning. Predictive models become more accurate, they can help tailor educational experiences to individual students. The Predictive models can identify students at risk of falling behind early in their academic careers, allowing educators to intervene with targeted support before issues escalate. The identifying factors that contribute to student success or dropout rates, predictive models can help institutions develop strategies to improve retention and graduation rates. The tracking of student performance over time can provide valuable insights into the effectiveness of educational interventions and policies.

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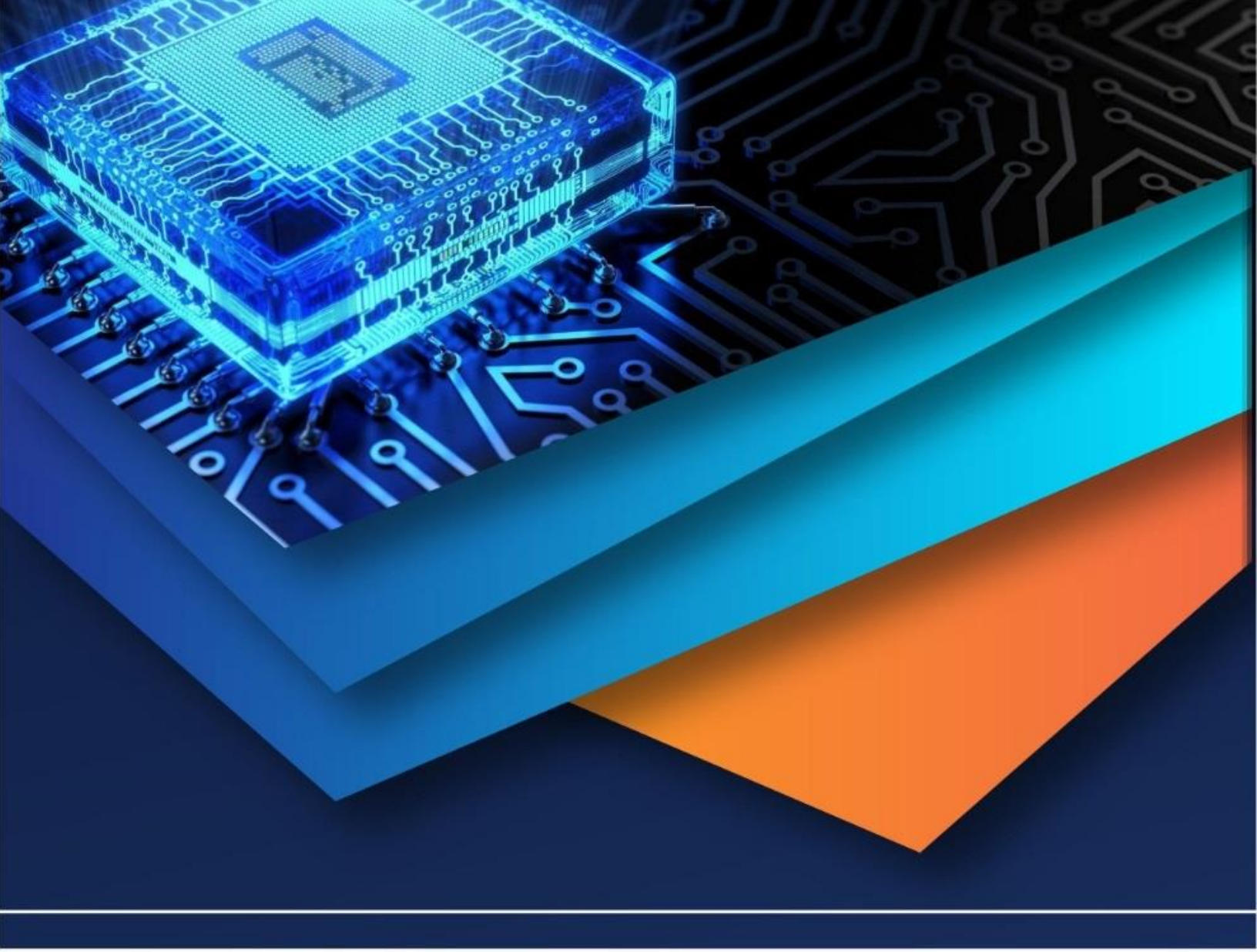

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