

# ACADEMIC ANALYSIS, PROGRESSION AND PREDICTION

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## ABSTRACT

Academic progression prediction and analysis is the process of using data and statistical methods to forecast and understand patterns in students' academic progress. This can involve predicting students' grades or likelihood of success in a particular program or course, identifying factors that may impact their academic progression, and analysing trends and patterns in student performance over time. This app is being built with engineering colleges in mind currently focused singularly for AMC Engineering College. We believe our application will prove to play profound role in uniting AMC students and teachers under a single application where students can keep track of their attendance, progress and predict their potential marks for the upcoming semesters with the help of our machine learning algorithms. Machine learning (ML) is a type of artificial intelligence that involves training algorithms on data in order to make predictions or decisions. In the context of predicting student marks, ML algorithms can be used to analyse data on students' past academic performance and other relevant factors, and use that data to build a model that can predict their grades in a particular course or program. Academic progression prediction and analysis is the process of using data and statistical methods to forecast and understand patterns in students' academic progress. This can involve predicting students' grades or likelihood of success in a particular program or course, identifying factors that may impact their academic progression, and analysing trends and patterns in student performance over time.

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## 1. Overview

Academic progression, prediction, and analysis refers to the process of tracking and analysing a student's academic performance and predicting their likelihood of success in future courses and academic programs using advanced algorithms such as linear regression and random forest. This process is typically supported by digital tools, such as

academic progression, prediction, and analysis web apps, which use these algorithms and artificial intelligence (AI) techniques to analyse a student's academic data and other relevant factors.

Early identification of risk: Academic progression prediction and analysis can help identify students who may be at risk of struggling academically and provide targeted support to help them succeed. This can involve using early warning systems or personalized learning approaches that are based on data and statistical analysis.

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### 1.1 Improved decision-making

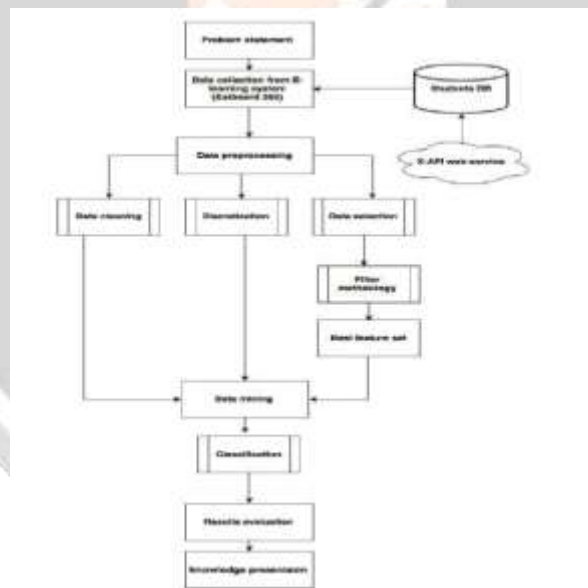
By analysing data on students' past academic performance and other relevant factors, educators and policymakers can make more informed decisions about academic pathways, support programs, and resources to improve academic outcomes.

### 1.2 Early identification of risk

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## 2. METHODOLOGY

Architecture Diagram



**Diagram 1:** Process of data mining and extraction

### 2.1 Algorithm Used and explanation

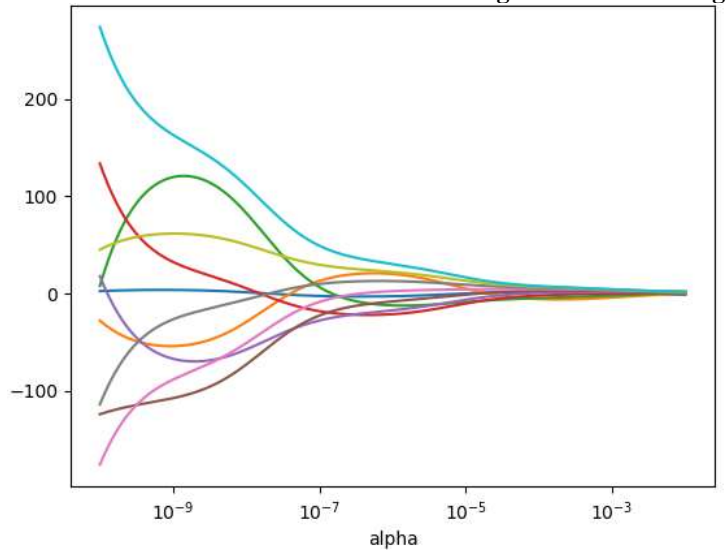
Lasso regression is a type of linear regression that is commonly used in data analysis and machine learning. It is particularly useful when dealing with datasets that have a large number of features, as it can help to identify which features are most important for predicting a particular outcome.

In the context of academic progression prediction, lasso regression can be used to identify which factors are most important for predicting a student's academic performance. For example, it can be used to determine which

variables, such as attendance, previous grades, or study habits, have the strongest correlation with a student's final grade in a particular course or program.

Lasso regression works by adding a penalty term to the standard linear regression equation, which helps to shrink the coefficients of less important variables towards zero. This has the effect of reducing the number of features that are included in the final model, and can help to prevent overfitting, which occurs when a model is too complex and performs well on the training data but poorly on new data.

**Diagram -2 : Lasso Regression**



### 3. CONCLUSIONS

In conclusion, this research paper has demonstrated the significance of academic progression prediction and analysis in enhancing the educational experience for both students and educators. By leveraging advanced statistical methods and machine learning techniques, such as lasso regression, we have been able to identify key factors that contribute to students' academic success and forecast their performance in future courses or programs.

The insights gained from this analysis can be used to inform targeted interventions and resource allocation, ensuring that students receive the support they need to excel in their academic pursuits. Furthermore, the development of a user-friendly application tailored to engineering colleges, such as AMC Engineering College, showcases the potential for technology to bridge the gap between students and educators, fostering a more collaborative and data-driven educational environment.

As the field of academic progression prediction and analysis continues to evolve, it is crucial for researchers, educators, and policymakers to stay abreast of emerging trends and best practices. By doing so, we can ensure that our educational institutions are equipped to adapt to the changing needs of students and provide them with the tools and resources necessary to achieve their full potential.

Ultimately, the findings of this research paper underscore the importance of a data-driven approach to understanding and supporting student success. By harnessing the power of machine learning and advanced analytics, we can unlock valuable insights into the factors that drive academic progression and use this knowledge to create more effective, personalized learning experiences for students around the world.

### 4. REFERENCES

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