

University Student Performance Prediction Based on Student's Habits Using Machine Learning Techniques

E.D.S.A. Lakmal, R.I.B.N. Mihiran, and W.M.S.A.B. Wanninayaka

Department of ICT, Faculty of Technological Studies, University of Vavuniya, Sri Lanka

Abstract

Student academic prediction has been the subject of growing research in higher education as a way of predicting students who are at risk and intervening to help them. Universities are constantly searching for evidence based ways of improving student outcomes, and data driven processes have been found to be useful tools for achieving this objective. By looking into students' educational history and behavior patterns, forecasting models can aid institutes in making informed decisions as well as help students make learning strategies and study habits active modifications. The main interest of this work is to create and validate a machine learning based model capable of forecasting undergraduate students' Cumulative Grade Point Average (CGPA). The research centers on how both academic indicators such as previous semester scores, course performance, and attendance and non academic drivers, including study time, co-curricular activities, and lifestyle, affect student success. The research follows a strict approach to achieve this objective. The data is first preprocessed through handling missing values, encoding categorical variables, and feature scaling to ensure consistency and reliability. A number of machine learning models are then imposed in a subsequent step in order to develop predictive models from linear to non-linear models. The models get trained and validated through a supervised learning framework, where the input features are student related variables, and the target feature is the CGPA. The performance of models is assessed using standard statistical metrics to enable an accurate comparison of the diversified approaches. The model provides a standardized framework for implementing machine learning in educational settings. It recognizes the use of predictive analytics in enhancing academic planning and student support as well as providing a basis for future research in performance prediction systems.

Keywords: Student performance, CGPA prediction, Machine learning, Higher education, Academic success