Research in educational data mining to establish or predict the retention of students in higher education institutions, as well as predict graduation performance abounds. This research is a data mining-based project aimed at generating a model that can be used for predicting student's ability to graduate on time. In this research we have examined various factors such as age, gender, continuous assessment results, and final exam results, determine how they influence a student's graduation schedule. We have demonstrated our application of classification as a data mining technique to identify interesting patterns, and subsequently use predictive techniques to predict the possible consequent outcome, and further have conducted a detailed examination of the J48, Bayes Net, PART and Random Forest predictive algorithms and compared to draw conclusions on the data mining prediction tools that give optimum results. The J48 stood out in terms of performance output.