Using Business Intelligence in College Admissions: A Strategic Approach

W. O. Dale Amburgey, Saint Joseph’s University, USA
John C. Yi, Saint Joseph’s University, USA

ABSTRACT

Higher education often lags behind industry in the adoption of new or emerging technologies. As competition increases among colleges and universities for a diminishing supply of prospective students, the need to adopt the principles of business intelligence becomes increasingly more important. Data from first-year enrolling students for the 2006-2008 fall terms at a private, master’s-level institution in the northeastern United States was analyzed for the purpose of developing predictive models. A decision tree analysis, a neural network analysis, and a multiple regression analysis were conducted to predict each student’s grade point average (GPA) at the end of the first year of academic study. Numerous geodemographic variables were analyzed to develop the models to predict the target variable. The overall performance of the models developed in the analysis was evaluated by using the average square error (ASE). The three models had similar ASE values, which indicated that any of the models could be used for the intended purpose. Suggestions for future analysis include expansion of the scope of the study to include more student-centric variables and to evaluate GPA at other student levels.

Keywords: Decision Trees, Enrollment Management, Enrollment Strategy, Neural Networks, Predictive Models

INTRODUCTION

Higher education has long been rich in data but slow in converting that data into useful information. In institutions ranging from large public research universities to small liberal arts colleges, vast amounts of data are collected by every internal entity. Some of the largest amounts of data are captured within universities’ enrollment management divisions. Admissions offices are inundated with geodemographic data on prospective students. Financial aid offices constantly collect data points relating to the personal or family financial situations of prospective and current students. Retention offices collect data to help identify students that may be at risk of dropping out. Enrollment management divisions are among the largest data collectors in higher education; however, they tend to lag behind the corporate world in conversion of data into usable information.

With the voluminous amounts of data collected within enrollment management divisions,
only within the past decade has there been a concerted effort to use that data to develop predictive models. Consulting groups have added enrollment management services to capitalize on the popular cultural shift to use of historical data to develop predictive analytics.

One of the most common uses of predictive analytics in enrollment management is for forecasting future first-year student enrollments. Many institutions, especially private colleges and universities, are tuition dependent, with most of their net revenues generated by student tuition. Being able to accurately forecast the number of entering students each year enables them to better plan and strategize improved benefits and services for all members of the college or university community.

PURPOSE OF THE STUDY

The purpose of this study is to develop a predictive model to assist undergraduate admissions officers in determining the likelihood of academic success for entering first-year students.

Incorporating into the admissions process a predictive model to identify the potential for success can be very advantageous. University admissions offices are seeing an increasing percentage of the applicant pool fall into a marginal category. Marginal applicants are loosely defined as those who are not definite admits or definite denials. These students’ academic credentials are not as sound as those of the upper-tier applicants but significantly better than those of unsuccessful applicants. Using a predictive model to determine applicants’ potential to have a strong grade point average (GPA) at the end of the first year should help alleviate most of the conjecture currently applied to making admissions decisions about marginal applicants.

As pertinent data is collected during the initial inquiry stage, these predictive models may be used to shape recruitment strategies and to target a specific message to the many audiences in the inquiry pool. For example, marketing messages relating to tutoring services or student success programs may be directed to applicants identified as having a low likelihood of earning a high end-of-first-year GPA.

Admissions counselors may also use predictive models to better counsel prospective students during their college search. Admissions representatives can counsel prospective students who display characteristics known to indicate academic distress about the possibility of future success. These discussions can help prospective students determine whether the rigor of the institution’s academic environment is suitable to their skills and abilities.

STUDY DESIGN AND METHODOLOGY

The primary methodology of the study consists of analysis of historical student data to determine the best-fit model to predict applicants’ end-of-first-year GPA. Three types of analytical models will be developed, and comparison testing will be conducted to determine the model displaying the lowest error.

Data stewards of the institution representing the Office of the Registrar, the Office of Financial Assistance, and the Director of Enrollment Analysis conferred to develop standards of acceptable use of the historical data. All agreed that the potential results of the study were significant enough to justify use of the data and that the study had to strive to protect the anonymity of the student data.

DATA COLLECTION AND ANALYSIS

Data was collected for entering first-year students at a midsized private university in the northeastern United States. The data was collected for first-year students beginning studies in the fall academic terms from 2006 through 2008. The data was collected from numerous sources within the enrollment management division and in other divisions of the university. The Common Application, the university application, the College Board, and the Free Application