Rio Salado College and Learning Analytics

Higher education has seen a surge of interest in data mining and predictive modeling methods over the past few years. These “learning analytics” have been made possible by capturing and utilizing the large amounts of information collected within campus enterprise systems, most notably the learning management system, to aid in teaching and learning initiatives. Rio Salado College has engaged in data mining and predictive modeling research since 2008, and is a national leader in this emerging field. The 2011 Horizon Report produced by New Media Consortium and the EDUCAUSE Learning Initiative indicates that learning analytics will have a significant impact and forecasts its wide-scale adoption within the next five years.

Eighth day at-risk model

An initial set of predictive models was constructed by Rio Salado in 2009 using enrollments from Fall 2008 and Spring 2009. Initially intended as a proof of concept, these models were also designed to drive an early intervention pilot for students at-risk of not achieving a grade of “C” or better in their college course. Separate course-specific models were constructed in fifteen courses across six discipline areas. Using the naïve Bayes classification method, the data were crunched on the eighth day of class. The models included approximately thirty input factors, including information derived from LMS activity logs, past enrollment patterns, and current enrollment status. The models were intended to produce estimated probabilities of course success which could then be translated to at-risk warning levels.

The models were tested cumulatively using random sub-sampling cross-validation with ten repetitions. On average, the highest success rate was found in the Low warning group and the lowest success rate was found in the High warning group. The mean success rate was approximately 70% in the Low warning group, 54% in the Moderate warning group, and 34% in the High warning group. Therefore, the models were accurate in assessing the likelihood of successful course completion and determining a student’s risk level.

RioPACE model

Following Rio Salado’s successful accuracy tests for the eighth day at-risk model, a new approach was developed in 2010 to provide a continuous evaluation of student at-risk levels beyond the eighth day of instruction, on a weekly basis. The objective was to provide an automated, systematic early-alert system that would allow instructors to launch proactive interventions at any point in the course to assist students who may show signs of struggle (i.e., slipping to a higher warning level). The model is named RioPACE, an acronym for Progress And Course Engagement.¹ Using a naïve Bayes model, RioPACE was designed to determine appropriate warning levels on a weekly basis using updated activity and grade information. It was also intended to provide instructors with information surrounding specific student performance data in areas that predict behaviors in log-in activity, site engagement, and pace.

¹ In 2009, the pilot system was originally entitled Rio STARS, an acronym for Rio Student At-Risk System. With Rio Salado College’s involvement in STARS (Sustainability Tracking Assessment & Rating System - see https://stars.aashe.org/) the name was changed to RioSOS (Status of Student), RioGPS (Guide for Progress and Success). Finally, the name was changed to RioPACE after faculty and students were surveyed regarding their recognition and preference.
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Rio PACE was then built to run automatically within the RioLearn LMS. Piloted in April 2010, warning levels are displayed next to each student’s information on the course roster, allowing an instructor to hover his or her cursor over an indicator, which then generates a small pop-up box showing the performance metrics for three critical areas: log-in frequency, site engagement, and pace. Contact with the student for interventions can then be implemented by the instructor according to the specific need area. The full deployment of the RioPACE model throughout all courses is currently in progress.

Rio Salado College is committed to “relentless improvement” as a college core value. Consequently, the college will continue to develop and refine its learning analytics capabilities involving data mining and predictive analytic models to support student success. As a national leader in learning analytics, Rio Salado is committed to sharing its best practices with the academic community.

Contact Information:

Vernon C. Smith, Ph.D.
Vice President Academic Affairs
Office 480.517.8270
FAX 480.517.8149
vernon.smith@riosalado.edu