The Computerworld Honors Program

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Final Copy of Case Study

Status:
Laureate

Year:
2013

Organization Name:
Marist College

Organization URL:
www.marist.edu

Project Name:
Open Academic Analytics Initiative (OAAI)

Please select the category in which you are submitting your entry.
Emerging Technology

Please provide an overview of the nominated project. Describe the problem it was intended to solve, the technology or approach used, how it was innovative and any technical or other challenges that had to be overcome for successful implementation and adoption. (In 300 words or less.)

The United States will face many challenges in the 21st century but none may be as great as our society's ability to successfully compete in the global economy. Most agree that the key to our success will be a highly educated workforce yet astonishingly the U.S. is not even ranked in the top ten countries when it comes to educational attainment (Associate degrees and higher) of our future workers. Although multifaceted, a major factor behind this global ranking is a national crisis in the percentage of students who successfully complete their education on time. Shockingly, the average four-year graduation rate for students (excluding transfers) seeking a Bachelor's degree is only 36%, a figure which drops even lower for minority students. The Open Academic Analytics Initiative (OAAI), an EDUCAUSE Next Generation Learning Challenges project led by Marist College and funded primarily by the Bill and Melinda Gates Foundation, is leveraging the power of business intelligence technologies and predictive analytics to address this degree completion crisis. OAAI has developed the first completely open source "academic early alert" system, which allows instructors to identify students at the

start of a course who are at risk to not complete it and then deploy interventions to help the student succeed. At the heart of the OAAI system is a predictive model that was developed by mining three historical data sets: student aptitude data, Learning Management System (LMS) event log data and electronic gradebook data. The OAAI early alert system extracts relevant student data as the course is underway and through a predictive model scoring process is able to identify which students are likely to not succeed in the course (see Appendix 1). Extracting and securing this confidential data presented several technical challenges, which we addressed by developing a specialized data cleansing protocol.

When was this project implemented or last updated? (Please specify month and year.) Has it incorporated new technologies and/or other innovations since its initial deployment? (In 300 words or less.)

The OAAI began in May 2011 with initial deployment taking place at three primary institutions (Savannah State University, College of the Redwoods and Cerritos College) in January 2012 as part of spring semester courses. Based on analysis of the outcomes of these initial deployments, improvements were made to the data processing "flows" in Pentaho, our primary business intelligence tool, as means to automate them in the future. In addition, the predictive model was enhanced to improve its accuracy. Our deployment was expanded in August 2012 to include a fourth institution, North Carolina A&T, in our fall semester implementations, which concluded in December 2012. Although the OAAI formally ends in January 2013, we expect to continue to expand adoption and make system improvements over the long-term.

If this is a previously submitted project that has been significantly updated and/or expanded, please describe the nature of the update here. (In 300 words or less.)

This project was not previously submitted.

Is implementation of the project complete? If no, please describe the project's phases and which phase the project is now in. (In 300 words or less.)

As of the submission of this application, we have completed our primary course implementations and are now analyzing our student impact outcomes from our fall semester, which represents the final work formally associated with the OAAI.

Please provide at least one example of how the technology project has benefited a specific individual or organization. Feel free to include personal quotes from individuals who have directly benefited from the work. (In 300 words or less.)

The OAAI conducted a research study in which our early alert system was implemented in 65 courses across four institutions (Savannah State University, North Carolina A&T, College of the Redwoods and Cerritos College) with over 2,200 students, many of whom were considered low income. In each of these courses, instructors were provided with Academic Alert Reports, within the first three weeks of the course, listing those students who had been identified by the OAAI early alert system as being likely to not complete the course successfully. Instructors were then able to send a customized message to the student to note concern over their academic performance and suggest corrective action

(e.g. tutoring). Initial research findings have been very encouraging showing statistically significant improvements in course grades and "content mastery" (receiving a grade of C or greater) levels among those students in courses that used the system. For example, students who were in courses that were using the OAAI "early alert" system and received an intervention had an average increase of seven percentage points in their overall course grade versus students in our control groups (see Appendix 2). In addition to these measurable benefits to the students, instructors also responded positively, with one Cerritos faculty member saying she "became more vigilant about reaching out to individual students and providing them with outlets to master necessary skills [and as a result] received the highest volume of unsolicited positive feedback from students, who reported that they felt [she] provided them exceptional individual attention!" Similarly, a Savannah State instructor shared that the "Academic Alert Reports were a great way to communicate with students about their status in the class in a nonthreatening manner. Several students even thanked me for sending the notification and said they appreciated that I wanted to help them."

Would this project be considered an innovation, a best practice or other notable advancement that could be adopted by or tailored for other organizations and uses? If yes, please describe that here. (In 300 words or less.)

OAAI is the first analytics-based early alert system that uses all open-source technologies, which includes the Pentaho suite of open source Business Intelligence (BI) tools and the Sakai open-source Learning Management System. In addition, OAAI has made our predictive model available under an open license using the Predictive Model Markup Language, a standardized XML-based language developed by the Data Mining Group. This approach will not only allow others to import the model into other BI tools, such as IBM's SPSS, it will facilitate the ongoing enhancement of the model. Finally, all of the system documentation and data integration "flows" have also been released under open licenses. The OAAI's decision to follow an open source strategy was made with the intention of facilitating adoption and customization by other organizations. Releasing our early alert system under an open license will reduce the Total Cost of Ownership for institutions while also allowing them to modify the predictive model to better meet their particular needs. For example, institutions with a primarily online student population will be able to use their data to tweak the model to make it more accurate for that context. Such enhancements may also be contributed back to allow other institutions to benefit from them. We are currently engaged in dissemination activities that are aimed at increasing adoption. This includes presentation of a related research paper at the international Learning Analytics and Knowledge conference as well as an EDUCAUSE "Seeking Evidence of Impact" Case Study. Through such efforts a number of higher education institutions, both in the United States as well as Europe, have already expressed interest in adopting the OAAI early alert system. Based on this interest we expect to meet our goal of several new institutions adopting by the end of 2013.

If there are any other details that the judges should know about this project, please note them here. (In 300 words or less.)

The OAAI has also engaged in research on different student intervention strategies and to what degree they positively impact on student academic performance and course completion rates. As part of this research an Online Academic Support Environment (OASE) was developed which instructors encouraged students who were at risk to not complete their course to participate in. The OASE was built using a web-based Sakai collaboration site that supports both content creation and communication tools. This allowed institutions to provide students with a range of academic support content such as skill assessments designed to allow students to identify area of weakness as well as remediation materials that could be used to improve basic knowledge. A key design strategy was the use of Open Educational Resources (OER), which are instructional materials that have been made available online for free under Creative Commons licenses. For example, the OASE uses tutorial videos from the Khan Academy as a means to provide students with opportunities to improve their mathematics knowledge. Using OER materials means that others can adopt the OASE model without incurring additional cost. In addition to content, the OASE also facilitates, through the use of online discussion tools, interactions between students and academic support staff as well as peer mentors. Finally, the OAAI also conducted research into the "portability" of predictive models to examine the degree to which a model built using data from one type of institution (e.g. private college) could be deployed in different academic context (e.g. community college). Surprisingly, we found that the model remained very accurate (60-75% range) even when it was used at institutions that were very different from where it was initially developed. We are now working to customize models for specific types of institutions in hopes of further increasing the accuracy.