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## Decision Support Systems

Volume 49, Issue 4, November 2010, Pages 498-506

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# A comparative analysis of machine learning techniques for student retention management

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<https://doi.org/10.1016/j.dss.2010.06.003>

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### Abstract

Student retention is an essential part of many enrollment management systems. It affects university rankings, school reputation, and financial wellbeing. Student retention has become one of the most important priorities for decision makers in higher education institutions. Improving student retention starts with a thorough understanding of the reasons behind the attrition. Such an understanding is the basis for accurately predicting at-risk students and appropriately intervening to retain them. In this study, using five years of institutional data along with several data mining techniques (both individuals as well as ensembles), we developed analytical models to predict and to explain the reasons behind freshmen student attrition. The comparative analyses results showed that the ensembles performed better than individual models, while the balanced dataset produced better prediction results than the unbalanced dataset. The sensitivity analysis of the

models revealed that the educational and financial variables are among the most important predictors of the phenomenon.



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## Keywords

Retention management; Student attrition; Classification; Prediction; Machine learning; Sensitivity analysis

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**Dr. Dursun Delen** is an Associate Professor of Management Science and Information Systems in the Spears School of Business at Oklahoma State University (OSU). He received his Ph.D. in Industrial Engineering and Management from OSU in 1997. Prior to his appointment as an Assistant Professor at OSU in 2001, he worked for a privately-owned research company, Knowledge Based Systems Inc., in College Station, Texas, as

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