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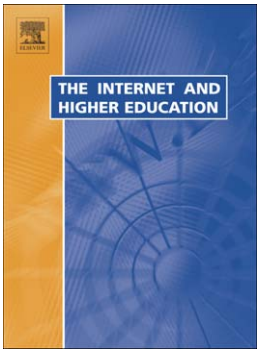

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Contrasting Prediction Methods for Early Warning Systems at Undergraduate Level

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Abstract

Recent studies have provided evidence in favour of adopting early warning systems as a means of identifying at-risk students. Our study examines eight prediction methods, and investigates the optimal time in a course to apply such a system. We present findings from a statistics university course which has weekly continuous assessment and a large proportion of resources on the Learning Management System Blackboard. We identify weeks 5-6 (half way through the semester) as an optimal time to implement an early warning system, as it allows time for the students to make changes to their study patterns whilst retaining reasonable prediction accuracy. Using detailed variables, clustering and our final prediction method of BART (Bayesian Additive Regressive Trees) we can predict students' final mark by week 6 based on mean absolute error to 6.5 percentage points. We provide our R code for implementation of the prediction methods used in a GitHub repository[1].

Keywords: Learning Analytics; Early Warning Systems; Undergraduate Education; Prediction Modelling

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[1]Abbreviations: Bayesian Additive Regressive Trees (BART); Random Forests (RF); Principal Components Regression (PCR); Multivariate Adaptive Regression Splines (Splines); K-Nearest Neighbours (KNN); Neural Networks (NN) and; Support Vector Machine (SVM)

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