

### **P13 APPLICATION OF THE RANDOM FOREST ALGORITHM FOR PREDICTING 4TH AND 7TH GRADE GPA**

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Predicting academic success (GPA) is one of the key research tasks in educational psychology nowadays, with an ongoing debate about which predictors contribute the most to this prediction. Previous research suggests that cognitive readiness for school (e.g., attention, working memory test scores, etc.) represents one of the most significant predictors of academic success during schooling. Furthermore, numerous studies have confirmed a significant contribution of other social factors (e.g., parents' education, gender, etc.) to GPA. However, most prior studies used traditional methods like linear regression and ANOVA, which lack precision in identifying key predictors of GPA. In contrast, machine learning (ML) models offer enhanced predictive power by analyzing complex data patterns. Following this statement, the present study sought to predict GPA in 4th and 7th grade based on cognitive readiness for the school and additional factors (e.g., parental education, gender, etc.), utilizing the Random Forest algorithm as a machine learning technique. The final data set involved 15 measures from 218 participants from elementary school in Serbia. The results indicate that the model predicting 4th grade GPA has a correlation coefficient of  $R = .507$  and that the most important predictors are Coding ( $I = .297$ ), Memory ( $I = .192$ ), General Knowledge ( $I = .174$ ), Block Design ( $I = .160$ ) and Parental assessment of the child's future academic success ( $I = .080$ ). Results also indicate that the model for predicting 7th grade GPA demonstrates excellent accuracy ( $R = .953$ ) and that the most important predictors are 4th grade GPA ( $I = .972$ ), Coding ( $I = .004$ ), Memory ( $I = .004$ ), Block Design ( $I = .003$ ) and General Knowledge ( $I = .003$ ). Results suggest that, although scores on cognitive readiness for school assessment are undoubtedly important, the most important predictor of GPA is success in previous grades - students who do well in 4th grade will also do well in 7th grade.

Keywords: GPA, school readiness, Random Forest, machine learning, elementary school