

## Documents

Lestari, W.<sup>a</sup>, Abdullah, A.S.<sup>b</sup>, Amin, A.M.A.<sup>b</sup>, Nurfaridah<sup>c</sup>, Sukotjo, C.<sup>d</sup>, Ismail, A.<sup>a</sup>, Ibrahim, M.S.M.<sup>e</sup>, Insani, N.<sup>c</sup>, Utomo, C.P.<sup>c</sup>

**Artificial intelligence to predict pre-clinical dental student academic performance based on pre-university results: A preliminary study**

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<sup>a</sup> Department of Fundamental Dental and Medical Sciences, Kulliyah of Dentistry, International Islamic University Malaysia, Kuantan, Malaysia

<sup>b</sup> Kulliyah of Dentistry, International Islamic University Malaysia, Kuantan, Malaysia

<sup>c</sup> Department of Informatics, Faculty of Information Technology, Universitas YARSI, Jakarta, Indonesia

<sup>d</sup> Department of Prosthodontics, University of Pittsburgh, School of Dental Medicine, Pittsburgh, PA, United States

<sup>e</sup> Department of Paediatric Dentistry and Dental Public Health, Kulliyah of Dentistry, International Islamic University Malaysia, Kuantan, Malaysia

**Abstract**

**Purpose/Objectives:** Admission into dental school involves selecting applicants for successful completion of the course. This study aimed to predict the academic performance of Kulliyah of Dentistry, International Islamic University Malaysia pre-clinical dental students based on admission results using artificial intelligence machine learning (ML) models, and Pearson correlation coefficient (PCC). **Methods:** ML algorithms logistic regression (LR), decision tree (DT), random forest (RF), and support vector machine (SVM) models were applied. Academic performance prediction in pre-clinical years was made using three input parameters: age during admission, pre-university Cumulative Grade Point Average (CGPA), and total matriculation semester. PCC was deployed to identify the correlation between pre-university CGPA and dental school grades. The proposed models' classification accuracy ranged from 29% to 57%, ranked from highest to lowest as follows: RF, SVM, DT, and LR. Pre-university CGPA was shown to be predictive of dental students' academic performance; however, alone they did not yield optimal outcomes. RF was the most precise algorithm for predicting grades A, B, and C, followed by LR, DT, and SVM. In forecasting failure, LR predicted three grades with the highest recall, SVM predicted two grades, and DT predicted one. RF performance was insignificant. **Conclusion:** The findings demonstrated the application of ML algorithms and PCC to predict dental students' academic performance. However, it was limited by several factors. Each algorithm has unique performance qualities, and trade-offs between different performance metrics may be necessary. No definitive model stood out as the best algorithm for predicting student academic success in this study. © 2024 American Dental Education Association.

**Author Keywords**

artificial intelligence; dental admission; performance prediction; quality of dental education; students' performance

**Index Keywords**

academic achievement, adult, algorithm, article, artificial intelligence, controlled study, correlation coefficient, decision tree, dental student, female, forecasting, human, logistic regression analysis, machine learning, Malaysia, male, pharmaceuticals, prediction, random forest, support vector machine

**Correspondence Address**

Utomo C.P.; Department of Informatics, Jl. Letjen Suprpto, Cempaka Putih, Indonesia; email: chandra.prasetyo@yarsi.ac.id

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