UNIVERSITI TEKNOLOGI MARA

PREDICTION OF ENGINEERING STUDENTS' ACADEMIC PERFORMANCE USING NEURAL NETWORK AND LINEAR REGRESSION

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Thesis submitted in fulfilment
of the requirements for the degree of
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Faculty of Electrical Engineering

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CONFIRMATION BY PANEL OF EXAMINERS

I certify a panel of examiners has met on the 30 December 2015 to conduct the final examination of Pauziah Mohd Arsad on her Doctor of Philosophy thesis entitled "Prediction Of Engineering Students' Academic Performance Using Neural Network And Linear Regression" in accordance with Universiti Teknologi MARA Act 1976 (Akta 173). The Panel of Examiners recommend that the student be awarded the relevant degree. The Panel of examiners was as follows:

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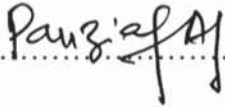Professor
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulation of Universiti Teknologi MARA (UiTM). It is original and is the result of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted or acknowledged as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This thesis describes the development of Electrical Engineering students' performance prediction model using Artificial Neural Network (ANN) based on SIMS data from three generations of Matriculation and Diploma students. It was observed that there was a certain pattern or trend between the strong ability students and the weaker ones in terms of performance. The strong ability students managed to graduate steadily with high CGPA upon graduation, while the weaker ones tend to waver and finally graduate with minimum CGPA or even extended for another one or two semesters to complete the required credit hours. The Grade Points (GP) of fundamental subjects attempted at semester one was used as inputs to the developed Neural Network Students' Performance Prediction Model (NNSPPM) to predict the output which is CGPA8 upon graduation. The fundamental subjects strongly influenced the overall performance of students. The NNSPPM was then tested with another set of input data consisting GP of subjects at semester three to see the predicted output. The NNSPPM was further validated with a different set of data, namely Diploma students taking the same subjects at semester three, sitting the same set of examination questions as that of Matriculation students. The trend and pattern of predicted output seemed to hold true for all three different cases. It was found that at lower CGPA8, the predicted output is higher than the actual CGPA8; while at high CGPA8, the predicted is lower than the actual CGPA8 for the Matriculation and Diploma students. Subsequently a second method, Linear Regression was used to predict the final CGPA. GP of subjects scored by students form the independent while the CGPA8 formed the dependent variable. However, when the coefficient of Correlation R was compared between the two methods, NN method was found to be more accurate in terms of prediction. The Mean Square Error or Residual is almost the same in both methods. Thus the fundamental subjects at semester one or three have direct impact on CGPA8. The fundamental subjects strongly influenced performance of students. By using the prediction model, strategic intervention by the academic advisors can be offered to the underachieving students once detected by the model.

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