

Prediction Model for World Ranking of Young Universities using Artificial Neural Network

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Abstract

This work is aimed at building prediction model that leverages data sources from the ranking body to estimate ranking position, given relevant parameters. Historical data of previous rankings from 2012 to 2016 were obtained from the database of Times Higher Education (THE). A single-layered, feed-forward Artificial Neural Network (ANN) with varying neurons (1-10) was set up based on the Scaled Conjugate Gradient (SCG) back-propagation algorithm. Ranking data that were based on Thomson Reuter's Web of Science database (2012-2015) were used for training the ANN. Model validation and testing were conducted with Scopus database ranking data (2016). The fitness and accuracy of the prediction model was evaluated based on statistical analysis. Statistical analysis showed that the prediction model gives a good and acceptable performance despite the recent change in the choice of database by the ranking body. The overall regression co-efficient for the network training was 0.964. A validation performance of 95.23% showed that the prediction model generalizes well enough for data that were not included in the training data set. The Mean Absolute Error (MAE), the Root Mean Square Error (RMSE), and the Standard Deviation (SD) were 5.59, 7.65, and 5.23 respectively. Therefore, the model guarantees acceptable prediction results.

Keywords

Prediction model, university ranking, higher education, artificial neural network.

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Aderemi A. Atayero is The Covenant University Professor of Communication Engineering and current Vice-Chancellor of the University. Professor Atayero has a Bachelor of Science Degree in Radio Engineering and a Master of Science Degree in Satellite Communication Systems in 1992 and 1994 respectively. He earned his PhD from the Moscow State Technical University of Civil Aviation (MSTUCA) in 2000. Atayero is a Fellow of the Science Association of Nigeria (FSAN) as well as a Senior Research Fellow of the International Association of Research Scholars and Administrators. Engineer Atayero is a COREN Registered Engineer and member of the Institute of Electrical and Electronic Engineers (IEEE) and other professional bodies. He has published over a hundred scientific papers in International peer-reviewed journals and proceedings. He is on the editorial board of several international scientific and engineering Journals. Atayero is a recipient of various awards and scholarships including the '2009 Ford Foundation Teaching Innovation Award'. His current research interests are in various aspects of Communication Engineering, including (but not limited to): Wireless Sensor Networks, Wireless (Mobile) Communications, Internet of Things (IoT), Smart Cities, and Cyber Physical Systems.

Oluwaseun A. Adeyemi is currently running a Masters degree program in Communication Physics with the Department of Physics, Covenant University, Ota, Nigeria. He earned his Bachelor of Engineering (B.Eng) degree in Physics Electronics from Federal University of Technology, Minna, Nigeria. He is the head of network and telecommunication services in the Center for Systems and Information Services (CSIS) unit, Covenant University, Ota, Nigeria. He holds a number of professional certifications in computer networking including: Cisco CCNA Routing & Switching, Cisco CCNA Security, and Cisco CCNP Routing & Switching. His research interest is in communication physics and computer networking.