Using GIS and Neural Network to Evaluate and Predict Student Success in Undergraduate Engineering Program

Aishwary Pawar
University of Michigan Dearborn
Dearborn, MI 48128, USA
pawara@umich.edu

Dr. DeLean Tolbert
University of Michigan Dearborn
Dearborn, MI 48128, USA
dtolbert@umich.edu

Abstract

College enrollment and academic preparation across the U.S. is still a challenge, with fewer but more diverse high school graduates each year which results in fewer engineering graduates. One approach to address these challenges is to explore trends in student enrollment and their success in engineering to identify typical student profiles. In the preliminary analysis, college access is explored by examining the demographics of the admitted college of engineering students in one year of study utilizing engineering undergraduate data and US Census databases. Where the data were visualized graphically using Geographic Information System (GIS) and the preliminary findings suggest that student zip codes can help visualize the factors affecting college access at the institution under study. The maps indicated a significant difference in the student demographics as represented by zip codes and gave a clear indication of which factors should be investigated further.

The preliminary research helped us to identify the concentration of students in a particular zip code, form clusters, develop relationship between factors and anticipate their effect on college access. It encouraged us to further our investigation and analyze different factors which may affect the students' success in colleges of engineering across the country. Thus, it drove us into the design, development, training, and testing of Feed Forward Neural Network with backpropagation for foreseeing student's success in terms of graduation results. Success will be defined based on the Final GPA of a student in Graduation. The network will be trained based on the dataset of recent graduates from University and will be tested to predict future outcomes. The network's structure will be optimized, and the predictive capability of the model will be tested.

This work can encourage partnerships that can drive institutional initiatives, k-12 educational policy, research and curricular changes that lead to greater support and success for engineering students. Now, the results from future work will give us an algorithm that will foresee the student's success in graduation.

Keywords
Engineering, Higher Education, GIS, Neural Networks.

Acknowledgements

Biography

Aishwary Pawar is a Graduate student in Department of Industrial Manufacturing and Systems Engineering at the University of Michigan-Dearborn, USA. He earned B.S. in Mechanical Engineering from Yeshwantrao Chavan College of Engineering, Nagpur, India. On campus, Aishwary is working as a Graduate student Research Assistant. Presently he is pursuing his master's Thesis where he plans to predict Student Success in CECS graduate program using Neural Networks. His research interests' centers around Data Science, GIS, Total Quality Management. He looks forward for a PhD in Industrial Engineering.