ANALYSIS OF ENTRY QUALIFICATION FOR STUDENT PERFORMANCE: AN INTELLIGENCE APPROACH

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ABSTRACT

This paper presents the intelligent system to investigate the influence of entry qualification, gender and entry results towards the student performance in university level. Entry qualifications are very important for the educational institution or educational providers to ensure quality graduate been produced. Total of 66 students were randomly selected in the faculty of mechanical engineering, Universiti Malaysia Pahang. The students are coming from foundation program, higher certificate of Malaysian Education (STPM) and diploma certificate. STPM is form six examinations in secondary school level. Radial Basis Function Network (RBFN) method was used to develop and predict the student's performance. RBFN is an important tool to study the different type of variables for student performance. The obtained results show that the entry results plays important role however the gender plays no significant. Good entry results student normally maintains their performance throughout the study and becomes an excellent graduate.

KEYWORDS*: Radial Basis Function, gender, entry qualification, student performance, intelligence approach.*

1.0 INTRODUCTION

Student performances during their study and after graduation are very vital issue to the education provider. Entry qualifications are

always critical for the educational institution or educational providers to ensure quality graduate been produced. Gender is an important factor for the activities which related to high energy or body contact. Generally men are bigger and stronger than women. Keeping in view the physical requirements on the adjustor described above, it could be argued that women in general are at a mechanical disadvantage which is not caused by inadequate psychomotor abilities but merely a result of being lighter and possessing less muscular force than men. Indeed, a longitudinal study by (Barnekiw-Bergvist *et.al*., 1996) on physical capacity in adolescence and adulthood offers support for such an assumption. The authors investigated the development of muscular endurance and strength from the age of 16 to the age of 34 and found, in accordance with previous studies. Although such findings suggest that women and endurance and strength from the age of 16 to the age of 34 and found, in accordance with previous studies, such findings suggest that women, and female mature students in particular, may be disadvantaged as far as certain physical properties of the adjustment are concerned, the consequence need not be that they will be less successful adjusters. It does, however, require them to make up for lack of physical stamina by increasing their fitness. This, for example, can be achieved by increasing the speed with which an adjustment is carried out (Beal, 1982, Haas, 1990a-1990d). Speed of performance is a frequent outcome variable used when effects of age and gender on psychomotor performance are assessed. (Mazaux *et.al*., 1995) looked at the effects of age, gender, and education on visuospatial attention and on psychomotor performance in elderly community residents and found that greater age and female gender were both associated with lower performance.

Personal qualities are very important to ensure the performances are always excellent. Numerous studies have been carried out in medical schools in an attempt to delineate those factors or personal qualities which determine the best physicians. According to (Entwistle *et.al*., 1971) there are a variety of paths that lead to either success or failure. (Entwistle *et.al*., 1971) found that next to study methods (including learning style and approach), motivation showed significant correlation with academic success. This was later confirmed by (Rhoads *et.al*., 1974), although they felt that motivation was the determining factor for students' performance. As stated by (Shen, 1994), it is known that medical students' level of achievement is influenced by both student characteristics and the characteristics of the school they attend. (Shen, 1994) analyzed student performances in Part I, II, and III of the National Board of Osteopathic Medical Examiners (NBOME) to look for the existence of gender effects. The results revealed that men performed

better than women in Part I, while performance was equal in Part II. In Part III women outperformed the male students. Similar findings have been reported in other studies (Weinberg and Rooney, 1973), (Linn *et.al*., 1980). In terms of learning style, a gender difference is not the significant difference in the preferred learning style between male and female students. The result is similar to the study by (Teng, 1997) and (Asiah, 1999) where they found that there is no significant difference in learning style between male and female students. In contrast, the results of the study contradict with (Jadid *et.al*., 2003) study where Bruneian female students were significantly more auditory than male students. Likewise (Sloan *et.al*., 2004) found that female students are inclined towards visual learning preferences. It is also observed that a large number of engineering students specified major and minor preferences in learning style categories but not negligible learning styles except individual learning. This finding is similar to (Chin, 2004) where individual learning is the least preferred style by engineering students. Further, according to (Shen, 1994), the gender differences did not vary among different schools, however, they could not be used as strong predictor for osteopathic medical students' performance. According to (Kadirgama *et.al*., 2008) in order to have good graduate engineer the foundation must be very strong, if the students want to perform better in final year subjects. (Sani *et.al*., 2008) claim that survey was found to be an essential tool to measure the performance of the student. Research from (Noor *et.al*., 2008) found that it's very important for all the lecturers to understand and implement student performance and can be measured and continuously improvement can be done.

There are many tools can be used to analyze the data. Artificial intelligent is one of important tool to measure the performance of the students. Neural network and multiple regression methods were used to understand the relationships between process parameters and top-bead width, and to predict the process parameters on top-bead width in robotic gas metal arc welding process (Kim *et.al*., 2003). Polar coordinate model were established to characterize the weld pool geometry. A neural network was therefore proposed to identify the parameters in real time. By using pulsed laser elimination, clear images of the weld pool could be captured. The developed image processing algorithm extracts the boundary of the weld pool in the real time, to determine the optimized welding process parameters and to obtain the desired weld bead geometry in gas metal arc welding (Zhang *et.al*., 1996). The output variables were the bead height and depth of penetration of weld bead. These output variables were determined according to the input variables, which are the root opening, wire feed rate, welding voltage and welding speed (Kim *et.al*., 2001). Neutral network was constructed

to obtain the relationship between welding process parameters and weld pool geometry in TIG welding process. An optimization algorithm called simulated annealing (SA) is then applied to the network for searching the process parameters with optimal weld geometry. From the observations made on the above literature optimization of friction welding parameters will be of time consuming if the conventional technique of optimization is used, by concentrating on a single parameter whereas keeping the others as constant (Tarang *et.al*., 1999). A hybrid intelligent method for Electric Discharge Machining process discusses on cultivating the advantages of the two methods namely artificial neural network (ANN) and genetic algorithm (GA) (Kesheng *et.al*., 2003).

This paper concentrate on developing RBFN models to investigate effect of the variables which are gender and entry results towards student performance through current cumulative grade point average (CGPA).

2.0 RADIAL BASIS FUNCTION NETWORK (RBFN)

The objective is to use the supervised network with RBFN and genetic algorithms (GA) as shown in Figure 1. The components of the input pattern consist of the control variables used in the student performance (entry qualification and gender), whereas the components of the output pattern represent the responses from sensors (current CGPA). During the training process, initially all patterns in the training set were presented to the network and the corresponding error parameter (sum of squared errors over the neurons in the output layer) was found for each of them. Then the pattern with the maximum error was found which was used for changing the synaptic weights. Once the weights were changed, all the training patterns were again fed to the network and the pattern with the maximum error was then found. This process was continued till the maximum error in the training set became less than the allowable error specified by the user. This method has the advantage of avoiding a large number of computations, as only the pattern with the maximum error was used for changing the weights. Genetic Algorithm (GA) was used to find the optimum weight, momentum and step size to be used in RBFN. Later the optimum weight will be fed to the RBFN. Then, train the network until the R.M.S.E reaches a satisfactory value as shown in Figure 2. The training data acquired from Response Surface Method to RBFN mode, and the epoch number is 10,000 (Sani *et.al*., 2008). After 1,000 iterations, the RBFN is better enough to produce acceptable results. Transfer function used as sigmoid, while for the momentum

used is 0.7. Designs of experiment table are shown In Table 1.

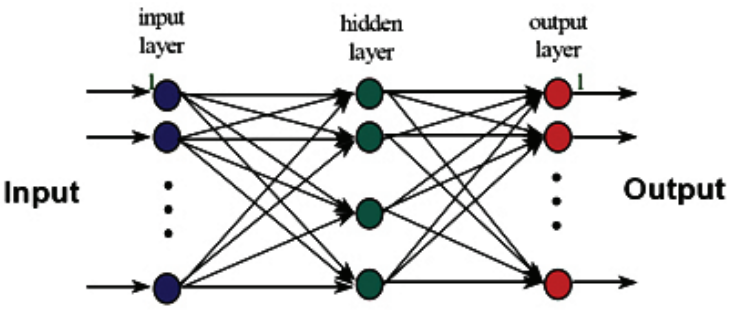

FIGURE 1
Neural Network

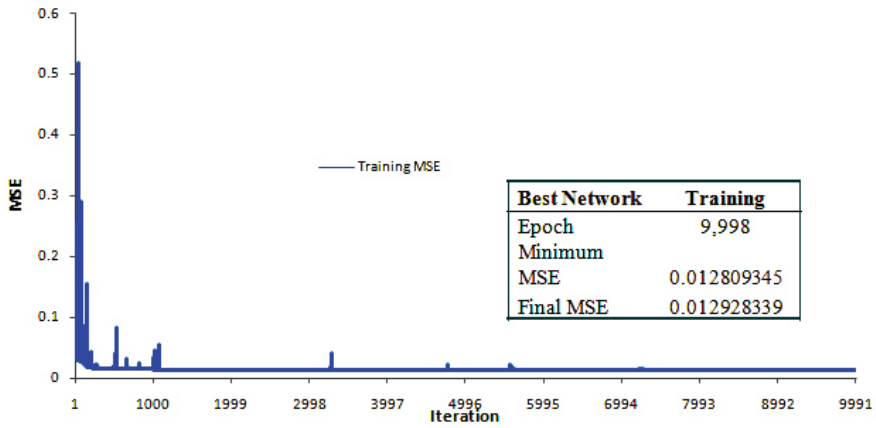

FIGURE 2
Number of iteration vs. mean square error

TABLE 1
Design of Experiment

Entry Result	Gender	Current CG2A	Entry Result	Gender	Current CG2A	Entry Result	Gender	Current CG2A
3.23	Male	3.27	2.54	Male	3.51	3.04	Male	3.00
3.19	Male	3.18	2.62	Male	3.13	2.58	Male	1.87
3.19	Male	3.05	2.56	Male	2.83	2.57	Male	3.29
3.13	Male	3.71	2.67	Female	3.27	2.64	Male	2.98
3.09	Male	2.71	3.07	Male	3.73	2.62	Male	3.02
3.12	Male	3.31	2.56	Female	3.38	2.63	Male	3.02
3.48	Male	3.53	2.53	Female	3.36	2.89	Male	3.13
2.84	Male	3.33	2.61	Male	3.49	2.90	Male	3.27
2.87	Male	3.11	2.52	Male	3.25	2.40	Male	3.42
2.96	Male	3.51	2.30	Male	2.87	2.43	Male	2.91
2.88	Male	3.42	2.43	Male	3.55	2.50	Male	2.93
3.07	Male	3.09	2.42	Male	3.60	2.50	Male	3.02
2.98	Male	3.29	2.39	Female	3.45	2.84	Male	3.40
3.03	Male	2.95	2.35	Male	3.60	2.87	Male	2.78
3.05	Male	3.25	2.23	Male	3.22	3.18	Male	2.95
2.90	Male	3.15	2.68	Male	3.09	2.72	Female	3.42
3.06	Male	2.89	2.68	Female	2.60	3.00	Female	3.45
2.93	Female	3.38	3.12	Female	3.38	3.00	Female	3.67
2.92	Male	3.29	3.19	Female	3.93	2.67	Male	3.49
2.96	Male	3.27	2.46	Female	3.53	2.58	Female	3.38
2.67	Male	3.38	2.98	Female	3.67	2.54	Male	2.89
3.06	Male	3.65	2.57	Male	3.07	2.89	Male	3.43

3.0 RESULT AND DISCUSSION

The prediction results by RBFN shown in Figure 3. The predictions result values shows very close to the real value. The results shown that women got a better cumulative grade point average (CGPA) compared to men. Most of the women's maintain their CGPA around 3.15 to 3.30. Whereas, the CGPA for the male students around 3.00 to 3.13. On the other hand, the entry results influence most of the student CGPA as shown in Figure 4. The higher entry results students maintain their performance by keeping high CGPA. Those entry results range 2.5~2.8, their current CGPA almost the same group ranged from 3.0 to 3.2.

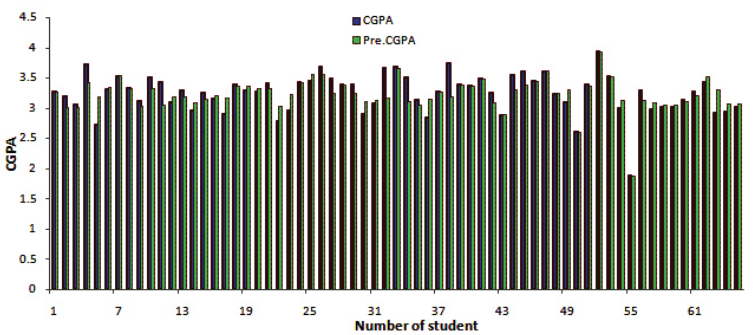

FIGURE 3
Prediction results by RBFN

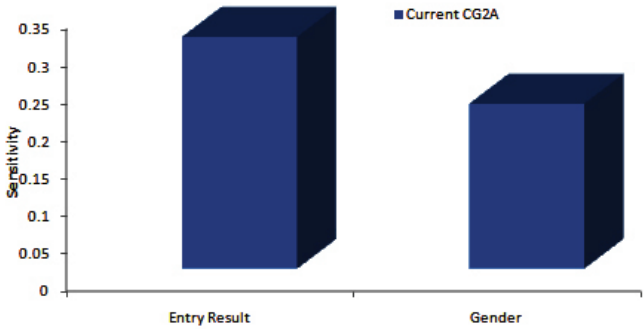

FIGURE 4
Sensitivity test

4.0 CONCLUSIONS

From the analysis, the results prove that entry qualifications have high impact and affect the student performance in CGPA. Meanwhile female students achieve better CGPA compare to male students. While many of the generated models did not have sufficient predictive power to be useful, the stronger models and other observations from the analysis provide useful insight into the relationships between the variables (entry results and gender). There are still numerous analyses that can also provide valuable information. While most of the models presented in this paper use only two variables. It is possible that more information and additional insights could be provided if more data available such as student attitude on time management, own study hours, student's age, student's background and etc. This information would ensure more comprehensive analysis of student's and subject performance and investigate the main effect of the CGPA. This artificial intelligent analysis tool is a very useful tool to investigate the student performance and study the variables.

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