

## The Entry Qualifications and Gender Analysis of Student Performance by using Artificial Intelligent Method

M.M.Noor, K.Kadirgama, M.M.Rahman, M.S.M.Sani, M.R.M.Rejab, M.Y.Taib,  
Abdullah Ibrahim, Rosli A.Bakar

**Abstract** - Entry qualifications are very important for the educational institution or educational providers to ensure quality graduate been produced. This paper presents the influence of gender, entry qualification and entry results towards the student performance in university. Total of 65 students were randomly selected in faculty of mechanical engineering, University Malaysia Pahang. Entries qualifications are from Foundation Program, Higher Certificate of Malaysian Education (STPM) and Diploma Certificate. STPM is form six examinations in secondary school level. Multilayer Perceptron Neural Network (MPNN) method was used to measure and predict the student's performance. Result from the study shows that gender not significant role but entry results plays important role. Good entry results student normally maintain their performance throughout the study and become excellent graduates. MPNN is an important tool to study the different type of variables for student performance.

**Keywords:** Multilayer Perceptron Neural Network, gender, entry qualification

### Introduction

Gender is an important factor for the activities with 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.* [1] 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 [2 – 6]. Speed of performance is a frequent outcome variable used when effects of age and gender on psychomotor performance are assessed. Mazaux *et al.* [7] 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 and Brennan [8] there are a variety of paths that lead to either success or failure. Entwistle *et al.* [9] 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.* [10], although they felt that motivation was the determining factor for students' performance. As stated by Shen [11], it is known that medical students' level of achievement is influenced by both student characteristics and the characteristics of the school they attend. Shen [11] 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 [12, 13]. 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 [14] and Asiah Pariekutty [15] 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 Pengiran Jadid's [16] study

M.M.Noor, K.Kadirgama, M.M.Rahman, M.Y.Taib, M.R.M.Rejab and M.S.M.Sani are from Faculty of Mechanical Engineering, Universiti Malaysia Pahang, 26300 Kuantan, Pahang, MALAYSIA. Phone: +609-5492223 Fax: +609-5492244, Email: [kumaran@ump.edu.my](mailto:kumaran@ump.edu.my) / [muhamad@ump.edu.my](mailto:muhamad@ump.edu.my)  
Abdullah Ibrahim is from Academic Staff Development Center, Universiti Malaysia Pahang, Email: [abi@ump.edu.my](mailto:abi@ump.edu.my)  
Rosli A. Bakar is from Automotive Excellent Center, Universiti Malaysia Pahang, Email: [rosli@ump.edu.my](mailto:rosli@ump.edu.my)

where Bruneian female students were significantly more auditory than male students. Likewise Sloan, Daane and Giesen [17] 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's [18] where individual learning is the least preferred style by engineering students. Further, according to Shen [11], 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 K.Kadirgama *et al.* [19] 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.* [20] claims that survey was found to be an essential tool to measure the performance of the student. Research from M.M.Noor *et al.* found that it's very important for all the lecturers to understand and implemented student performance and can be measured and continuously improvement can be done [21].

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 [22]. 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 [23]. 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 [24]. Neural 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 [25]. 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) [26].

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

### Multilayer Perceptions Neural Network

In the current application, the objective is to use the supervised network with multilayer perceptions neural network (MPNN) and train with the back-propagation algorithm (with momentum). 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 algorithms used to find the optimum weights to be use in MPNN. Fig.1 shows the neural network computational mode with 2-8-1 structure.

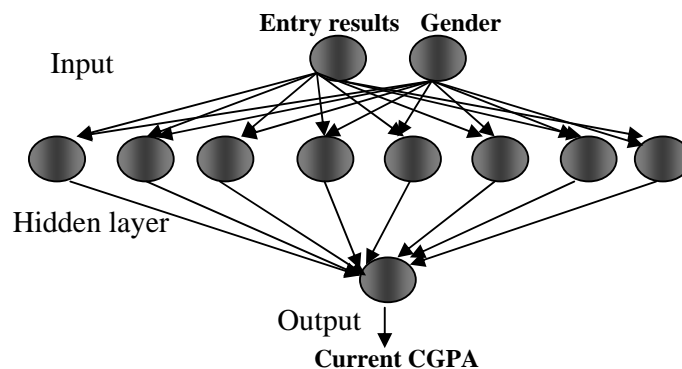


Fig. 1: Neural Network with 2-8-1 structure.

## Result and Discussion

The prediction results by MPNN shown in table 1. The predictions result values shows very close the real value. The results shown that women got a better cumulative grade point average (CGPA) if compare with men. Figure 1 shows that male student's result at lower scale as compare to female student. 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 2. 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.

Table 1: Prediction results by MPNN

Entry Result	Gender	Current CG2A	Current CG2A Output
3.23	Man	3.27	3.30
3.19	Man	3.18	3.27
3.19	Man	3.05	3.27
3.13	Man	3.71	3.24
3.09	Man	2.71	3.22
3.12	Man	3.31	3.23
3.48	Man	3.53	3.51
2.84	Man	3.33	3.15
2.87	Man	3.11	3.16
2.96	Man	3.51	3.17
2.88	Man	3.42	3.16
3.07	Man	3.09	3.21
2.98	Man	3.29	3.18
3.03	Man	2.95	3.19
3.05	Man	3.25	3.20
2.90	Man	3.15	3.16
3.06	Man	2.89	3.21
2.93	Women	3.38	3.46
2.92	Man	3.29	3.16
2.96	Man	3.27	3.17
2.84	Man	3.40	3.15
2.87	Man	2.78	3.16
3.18	Man	2.95	3.27
2.72	Women	3.42	3.35
3.00	Women	3.45	3.51
3.00	Women	3.67	3.51
2.67	Man	3.49	3.15
2.58	Women	3.38	3.32
2.67	Man	3.38	3.15
2.54	Man	2.89	3.16
2.57	Man	3.07	3.16
3.06	Man	3.65	3.21
2.98	Women	3.67	3.49
2.54	Man	3.51	3.16
2.62	Man	3.13	3.15

2.56	Man	2.83	3.16
2.67	Women	3.27	3.34
3.07	Man	3.73	3.21
2.56	Women	3.38	3.31
2.53	Women	3.36	3.31
2.61	Man	3.49	3.16
2.52	Man	3.25	3.16
2.30	Man	2.87	3.20
2.43	Man	3.55	3.18
2.42	Man	3.60	3.18
2.39	Women	3.45	3.31
2.35	Man	3.60	3.19
2.23	Man	3.22	3.21
2.68	Man	3.09	3.15
2.68	Women	2.60	3.34
3.12	Women	3.38	3.60
3.19	Women	3.93	3.65
2.46	Women	3.53	3.31
3.04	Man	3.00	3.20
2.58	Man	1.87	3.16
2.57	Man	3.29	3.16
2.64	Man	2.98	3.15
2.62	Man	3.02	3.15
2.63	Man	3.02	3.15
2.89	Man	3.13	3.16
2.90	Man	3.27	3.16
2.40	Man	3.42	3.18
2.43	Man	2.91	3.18
2.50	Man	2.93	3.17
2.50	Man	3.02	3.17

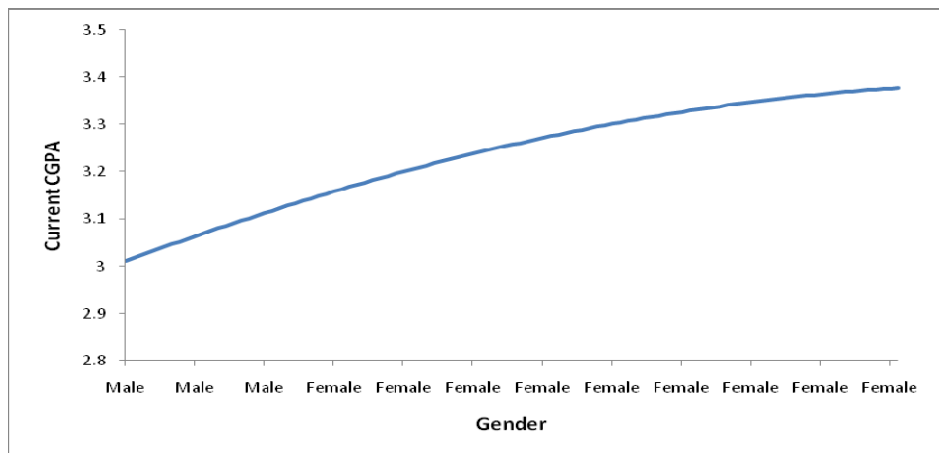


Figure 1: Analysis gender with current CGPA

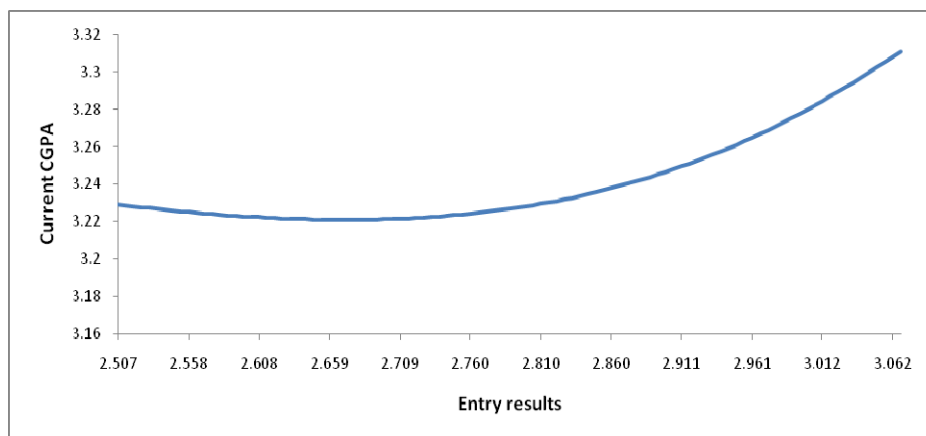


Figure 2: Analysis entry results with current CGPA

## Conclusion

Artificial intelligent is a very useful tool to investigate the student performance and study the variables. From the analysis, the results prove that entry results effect lot the student performance in CGPA. Meanwhile women students got better CGPA compare to men 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.

## ACKNOWLEDGEMENT

The authors would like to express their deep gratitude to Universiti Malaysia Pahang (UMP) for provided the financial support.

## References

- [1] Barnekiw-Bergvist M, Hedberg GI, Janlert U, Jansson E. Development of muscular endurance and trength from adolescence to adulthood and level of physical capacity in men and women at the age of 34 years. *Scand J Med Sci Sports* 1996;6:145–155.
- [2] Beal MC. Teaching of basic principles of osteopathic manipulative techniques. *J Am Osteopath Assoc* 1982;81(9):607–609.
- [3] Haas M. The physics of spinal manipulation. Part I. The myth of F D ma. *J Manipulative Physiol Ther*, 1990a;13(4):204–206.
- [4] Haas M. The physics of spinal manipulation. Part II. A theoretical consideration of the adjustive force. *J Manipulative Physiol Ther*, 1990c;13(5):253–256.
- [5] Haas M. The physics of spinal manipulation. Part III. Some characteristics of adjusting that facilitate joint distraction. *J Manipulative Physiol Ther*, 1990c;13(6):305–308.
- [6] Haas M. The physics of spinal manipulation. Part IV. A theoretical consideration of the physician impact force and energy requirements needed to produce synovial joint cavitation. *J Manipulative Physiol Ther*, 1990d;13(7):378–383.
- [7] Mazaux JM, Dartigues JF, Letenneur L, Darriet D, Wiart L, Gagnon M, Commenges D, Boller F. Ispatial attention and psychomotor performance in elderly community residents: Effects of age, gender and education. *J Clin Exp Neuropsychol*, 1995;17(1):71–81.
- [8] Entwistle NJ, Brennan T. The academic performance of students. 2. Types of successful students. In: Butcher H, Rudd E, eds., *Higher Education in the Seventies*. London: McGraw Hill, 1971; pp. 268–276.
- [9] Entwistle NJ, Nisbet J, Entwistle D, Cowell MD. The academic performance of students. 1. Prediction from scales of motivation and study methods. In: Butcher H, Rudd E, eds. *Higher Education in the Seventies*. London: McGraw Hill, 1971; pp. 258–267.
- [10] Rhoads JM, Gallemore JL, Gianturco DT, Osterhout S. Motivation, medical school admissions and student performance. *J Med Educ* 1974;49:1119–1127.
- [11] Shen L. Gender effects on student performances on the NBOME, part I, part II and part III. *Acad Med Oct Suppl* 1994;69(10):S75–S76.
- [12] Weinberg E, Rooney JF. The academic performance of women students in medical school. *J Med Educ* 1973;48:240–247.
- [13] Linn BS, Zeppa R. Sex and ethnicity in surgical clerkship performance. *J Med Educ* 1980;55:513–520.

- [14] Teng, Sia Wee, Stail belajar di kalangan pelajar pelajar Maktab Rendah Sains Mara. Unpublished tesis. Kuala Lumpur: Faculty of Education, University of Malaya. (1997).
- [15] Asiah Parie Kutty. Gaya pembelajaran dan pencapaian akademik di kalangan pelajar- pelajar tingkatan empat Sekolah Menengah Teknik Juasseh, Kuala Pilah, Negeri sembilan Darul Khusus. Unpublished thesis. Kuala Lumpur : Faculty of Education, University of Malaya. (1999).
- [16] Pengiran Jadid, Pengiran Rahmah. Learning-style perceptual preferences of Bruneian students. In *Academic Exchange Quarterly*, 7, p199(6). Retrieved March 08, 2006, from Expanded Academic ASAP via Thomson Gale(2003): <http://find.galegroup.com/itx/infomark.do?&contentSet=LAC>
- [17] Sloan,T, Daane,C.J, Giesen,J., Learning styles of elementary preservice teachers. *College Student Journal* (2004), 38.3: 494(7).
- [18] Chin, Yeoh Poh. Perceptual learning style preference of engineering students at a polytechnic. Unpublished thesis. Kuala Lumpur: Faculty of Education, University of Malaya (2004).
- [19] M.S.M.Sani, M.M.Noor, A.Senawi, A. Sulaiman, M.R.M.Rejab, "Assessment of the Mechanical Engineering Programs by Exit Surveys at University Malaysia Pahang", 4th. International Conference on University Learning and Teaching, 2008, 317-322.
- [20] K.Kadirgama, M.M.Noor, M.R.M.Rejab, A.N.M.Rose, N.M. Zuki N.M., M.S.M.Sani, A.Sulaiman, R.A.Bakar, Abdullah Ibrahim, "Importance of the Pre-Requisite Subject", 4th. International Conference on University Learning and Teaching, 2008, 168-172.
- [21] M.M.Noor, M.R.M.Rejab, K.Kadirgama, M.S.M.Sani, A.Sulaiman, M.M.Rahman, A.N.M.Rose, R.A.Bakar, Abdullah Ibrahim, "Quality Management System in the Implementation of OBE at Faculty of Mechanical Engineering, UMP", 4th. International Conference on University Learning and Teaching, (2008). 277-285.
- [22] Ill-Soo Kim, Joon-Sik Son, Prasad Yarlagadda, K.D.V., 2003. A study on the quality improvement of robotic GMA welding process, *Robotics and Computer Integrated Manufacturing* 19, 567– 572.
- [23] Zhang, Y.M., Kovacevic, R., Li, L., 1996. Characterization and real-time measurement of geometrical appearance of the weld pool. *International Journal of Machine tools &Manufacture* 136, 799–816.
- [24] Kim, D., Rhee, S., 2001. Optimization of arc welding process parameters using a genetic algorithm. *Welding Journal*, 184–189.
- [25] Tarang, Y.S., Tsai, H.L., Yeh, S.S., 1999. Modeling optimization and classification of weld quality in tungsten inert gas welding. *International Journal of Machine Tools & Manufacture* 39, 1427–1438.
- [26] Kesheng,W., Hirpa, L., Gelgele, Y., Qingfeng, Y., Minglung, F., 2003. A hybrid intelligent method for modeling the EDM process. *International Journal of Machine Tools & Manufacture* 43,995–999.