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PREDICTING THE AREA OF SPECIALIZATION USING NEURAL NETWORK

A thesis submitted to the Graduate School
in partial fulfilment of the requirements for the degree
Master of Science (Information Technology),
Universiti Utara Malaysia
by
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GRADUATE SCHOOL
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ABSTRAK (BAHASA MALAYSIA)

Peramalan merupakan salah satu kebolehan unik teknologi rangkaian neural. Pendekatan ini boleh digunakan dalam semua bidang yang mempunyai pengetahuan berstruktur tinggi boleh diwakili oleh paten. Rangkaian neural kerap digunakan sebagai suatu mekanisma penting dalam industri seperti pendidikan, perniagaan, kewangan, perbankan, perubatan, sains angkasa lepas, pemasaran dan sebagainya. Banyak permasalahan harian yang boleh diramal dan sekaligus membantu dalam pembuatan keputusan yang efektif di masa hadapan. Objektif kajian ini bertujuan untuk menilai teknik rangkaian neural dalam meramal bidang pengkhususan para pelajar Sarjana Muda Teknologi Maklumat (B.I.T.), Universiti Utara Malaysia (UUM). Kaedah pembelajaran terarah digunakan bagi mendapat keputusan terbaik daripada data. Kajian ini meliputi perbincangan ringkas berkaitan konsep-konsep rangkaian neural, metodologi yang digunakan, bidang pengkhususan set data (penilaian kes) dan juga berkenaan pembelajaran terarah. Pembangunan aplikasi melibatkan kutipan dan pengurusan data, kemudiannya diikuti dengan simulasi rangkaian neural untuk latihan dan ujian. Data yang digunakan telah disediakan oleh Sekolah Teknologi Maklumat (STM), Universiti Utara Malaysia. Model rangkaian yang terbaik telah menghasilkan ketepatan ramalan berjumlah 95.79 %. Ini jelas menunjukkan kemampuan rangkaian neural mampu diaplikasikan bagi membentuk sistem sokongan keputusan pendidikan.

ABSTRACT (ENGLISH)

Prediction is one of the unique capabilities of neural network technology. This approach can be used in any area where knowledge is highly structured and can be represented in patterns. Neural networks have been used as a mechanism for a lot of industries such as in education, businesses, finance, banking, medicine, space science, marketing and others. A lot of real problems that can be predicted in order to obtain the most effective decision-making in the future. The objective of this study is to evaluate neural network techniques in predicting the area of specialization of Bachelor in Information Technology (B.I.T.) students at Universiti Utara Malaysia (UUM). In order to gain the best performance of the data, the method used is supervised learning. The study covers a brief discussion on the neural network concepts, the methodology used and the area of specialization dataset as a case study and also including a brief discussion on supervised learning. The development of application involves data collection and management, then followed by neural network simulator for training and testing. The data used for training and testing the network was provided by Sekolah Teknologi Maklumat, Universiti Utara Malaysia. The best network model produced a prediction accuracy of 95.79 %. This clearly shows that neural network has a potential to be used for building education decision support system.

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CHAPTER 1
INTRODUCTION

Predicting or Forecasting is the estimation of the value of a variable (or set of variables) at some future point in time. Its process is usually carried out in order to provide assistance to decision-making and also in planning the future. These processes work on the principle that if we can predict what the future will be like, we can therefore modify our behaviour now to be in a better position, than we otherwise would have been, when the future arrives.

To implement this process, it uses a technique that train the examples of data where the value of the variable to be predicted is already known, along with the historical data for those examples. The historical data is used to build a model that explains the current observed behaviour. When this model is applied to current inputs, the result is a prediction of future behaviour.

Some applications that require forecasting models are listed below:

i. Inventory control/production planning - forecasting the demand for a product enables us to control the stock of raw materials and finished goods, plan the production schedule and others.
ii. Investment policy - forecasting financial information such as interest rates, exchange rates, share prices, the price of gold and others. This is an area in

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