WEB BASED NEUROFUZZY FOR CLASSIFYING DIABETES WOMAN WITH HISTORY OF PREGNANCY

A thesis submitted to the Graduate School in partial fulfillment of the requirements for the degree Master of Science (Intelligent Knowledge Based System) Universiti Utara Malaysia

by

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ABSTRAK

World Wide Web (WWW) *adalah satu medium yang popular untuk mencapai dan mengintegrasi pengetahuan. Neurofuzi adalah gabungan teknik kepintaran buatan yang terdiri daripada rangkaian neural dan logik kabur. Rangkaian neural telah dibangunkan untuk meniru cara manusia memproses maklumat, belajar dan cara membuat keputusan. Nama rangkaian neural diperolehi berdasarkan bahawa otak manusia boleh dilihat sebagai rangkaian neuron yang saling berhubungan atau satu unit pemprosesan maklumat. Logik kabur diperkenalkan untuk mengatasi masalah tersebut dengan menyediakan kalkulus yang sistematik yang dapat menghasilkan maklumat yang linguistik tetapi ia kurang berupaya dalam menghadapi perubahan luaran. Kencing manis adalah satu keadaan dimana terdapat kandungan gula yang tinggi di dalam darah. Pengkelasan dan pengesanan kencing manis terhadap wanita yang pernah mengandung adalah amat penting untuk memastikan pesakit tersebut mendapat rawatan diperingkat awal dan pengesanan awal penyakit kencing manis ini amat penting kerana penyakit kencing manis ini boleh menyebabkan beberapa komplikasi kesihatan seperti penyakit jantung, kabur penglihatan dan kerosakan buah pinggang. Projek ini bertujuan untuk membangunkan neurofuzi dalam pengkelasan penyakit kencing manis bagi wanita yang pernah mengandung. Pembangunan prototaip adalah menggunakan teknik neurofuzi untuk mengkelaskan samaada wanita tersebut menghidap kencing manis atau disyaki menghidap kencing manis atau tidak menghidap kencing manis. Pembangunan prototaip sistem terdiri daripada 4 fasa pembangunan sistem. Fasa pertama ialah "fuzzification" iaitu kaedah logik kabur yang digunakan untuk menukarkan data sebenar kepada data kabur. Fasa kedua ialah latihan rangkaian neural.menggunakan pembelajaran rambatan balik. Fasa ketiga ialah "defuzzification" iaitu kaedah untuk menukarkan output kabur kepada nilai sebenar. Fasa terakhir ialah untuk membangunkan sistem pengkelasan kencing manis berasaskan web bagi pesakit baru. Prototaip sistem ini dibangunkan menggunakan perisian Microsoft Visual Basic dan Coldfusion 4.5. Data untuk sesi latihan dan ujian diperolehi dari repositori yang popular iaitu repository UCI. Penemuan menunjukkan sistem neurofuzzy memperolehi 95.45% berbanding 88.31% yang diperolehi oleh rangkaian neural. Ini menunjukkan sistem neurofuzzy berjaya meningkatkan prestasi rangkaian.*

ABSTRACT

World Wide Web (WWW) is known as a popular medium to achieving and integrating knowledge. Neurofuzzy is a combination of Artificial Intelligence (AI) techniques, namely neural network and fuzzy logic. Neural networks were originally developed to mimic human information processing, learning, and decision making. The name neural network arises from the fact that the human brain can be viewed as networks of interconnected neurons or information processing units. On the other hand, fuzzy logic is introduced to deal with a problem by providing the systematic calculus that can make the information linguistically but lacks of adaptability to deal with changing external environments. Diabetes is a chronic condition associated with abnormally high levels of glucose (sugar) in the blood. The classification of diabetes woman with history of pregnancy is important in determining the most appropriate form of treatment for these patients and the early detection of diabetes is important because the diabetes disease can cause serious health complications like heart disease, blindness and kidneyjailure. The purpose of this study is to develop a neurofuzzy system prototype in classifying the diabetes woman with history of pregnancy. The prototype system will classify whether the woman having diabetes, suspected to have diabetes or does not have diabetes. The development of the prototype system involves four phases of system development. The first phase is fuzzification in order to fuzzify the real data. The second phase, concentrates on the development of neural network engine using backpropagation for network training and testing. The third phase is defuzzification in order to convert the fuzzy output to real data. The final phase is to develop a web based classifying system for classification on new patient's data. The system has been developed using Microsoft 's Visual Basic and Coldfusion 4.5. The data used to train and test the network was obtained from well-known repository that is UCI repository. The combination of neural network with fuzzy technique or neurojuzzy obtains 96.1% from the best network model. However, only 88.31% of classifying accuracy was obtained when the neural network model was used. The finding indicates that the combination of fuzzy process with neural network model increases the performance of the net.

ACKNOWLEDGEMENT

Assalamualaikum w.b.t

In the name of Allah the Mighty God, I would like to express my gracefulness to Him The Most Gracious that gives me the strength and courage to complete this project report as a final requirement for Msc. IKBS students of School of Information Technology.

I would like to first extend my appreciation to my supervisor, Associate Professor Fadzilah Siraj for giving me a chance to improve my skill and knowledge in developing intelligent systems. In addition, I would like to thanks to my beloved parent En. Mohd Ali Bahari and Pn. Zawiyah Muharam for their support and prays and not forgetting my fiancé Mohd Hilmi Jaafar who always in my heart.

Last but not least, I would to extend my gratitude to my friends Azliza Mohd Ali, Wannoraini Abdul Latif, Nooraini Yusoff, Syahida Hassan, Salwa Muda, Suzana Zambri, Azlin Ahmad and Zakaria Hussain for their helps throughout the completion of this project. I have learned more about living, which can be so meaningful to me to take a new journey of my life.

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CHAPTER 1

INTRODUCTION

1.1 Overview

World Wide Web (WWW) is known as a popular medium to achieving and integrating knowledge. Innovations in computing and telecommunications technologies have fostered the ever expanding application of teleconsultation in healthcare today. Teleconsultation takes that advantages to share health information with people around the world and Malaysia for instance, has it's own teleconsultation project known as TeleHealth through WorldCare Health Malaysia that has been awarded by Multimedia Super Coridor Teleconsultation Flagship Application (Mohan, 2003). Its mission is to enhance the quality of medical services provided by Ministry of Health.

The developed prototype used neurofuzzy techniques to classify whether the woman with pregnancy history is having diabetes, suspected to have diabetes or does not have diabetes. The neurofuzzy is used for classify the diabetes woman with pregnancy history because there are many evidence prove that neurofuzzy successfully been applied in medical data. Both web based classification system and backpropagation process need a fuzzification process and defuzzification

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