Chapter 25
Personalized Neuro–Fuzzy Expert System for Determination of Nutrient Requirements

Priti Srinivas Sajja
Sardar Patel University, India

Jeegar Ashokkumar Trivedi
Sardar Patel University, India

ABSTRACT

In the modern fast and stressful life, an individual does not have time to take an extra care for one's self. Support from general information about health and nutrient requirement through modern computing infrastructure is very limited and common. Generic information on the Web and other media sometime raises genuine queries about the good health. Further, typical solutions available may not interact with users in friendly way and deal with vague inputs provided by users. To resolve this issue, a system is required which knows its users, acts smartly and friendly, learns from past data & history and provides customised advisory. This chapter introduces a neuro-fuzzy architecture, based on which an expert system for determination of nutrient requirements is presented. The chapter includes in depth literature survey, concepts, implementation details with sample code, neural network structure, fuzzy membership functions used, sample input–output screens of the system and future work.

INTRODUCTION

Traditionally happiness is defined as good health; and everybody wants to be happy! In the modern fast and stressful life, an individual may not have time to take an extra care for one's self. It is necessary to observe daily routine of a person and set nutrition need accordingly, which requires an expert's advice which many cannot afford. Though, everybody gets lot of information from the platform life Internet and

the Web, such information is not much useful because every individual is different. Each needs a customised advice to plan one's health and set nutrition requirement accordingly without taking much trouble.

The advances of information and communication technology (ICT) can make this possible. The ICT enables use of various devices such as computers, mobiles and other machines with necessary supporting architecture such as networking, protocols, techniques, architectures and standards.

Many solutions exist to guide an individual for his routine healthcare since a long time. Most of them try to provide generalised information collected from various resources, stored at a given location in a very structured, predefined form and can be accessed in restricted manner. Commonly observed limitations of such systems can be given as follows.

- One has to collect, organise and store information at a given location in a rigid format;
- The information collected is common for everybody, hence only generalised solution can be offered by such system;
- Most of the systems are legacy and available on a single computer or a single device at doctor's clinic or expert's office;
- Most of the systems are mainly database oriented in nature and do not offer advantages of knowledge orientation; and
- Such systems do not take advantages of modern architecture such as cloud and grid.

There are some exceptions to the aforementioned observations. People have successfully implemented and used rule base expert systems on the Web. Such systems take advantage of latest infrastructural facilities such as the Web and also offer advantages related to added intelligence using expert system techniques. However, decision making about the personal need requires much more. It is difficult to generalise decision making process and hence requirements of users. It can be learn from the part experience and data. Further, user's inputs and experience data are vague in nature. This leads to utilization of a modern artificial intelligence techniques such as neural network and fuzzy logic in a hybrid fashion. Neuro-fuzzy hybridising can offer an impressive solution here. Considering this, following objectives can be set.

- There should be an architecture facilitating use of a hybrid neuro-fuzzy system for decision making. Such architecture may be used for other applications also in related domains;
- The architecture should operate on the Web, preferable cloud or closed knowledge grid, so that data and input from various distributed resources can be used in effective manner;
- A system is to be developed based on the architecture designed in such a way that it understands its users, learns from their behaviour and provides tailor made advisory to the users;
- The system should document user's information, data and knowledge about the business in a suitable ontology or structure;
- The system also should be capable of dealing with partial and fuzzy information as well as system should learn from the past data of users;
- Alternatively, such system may be operational on personal devises such as mobile and wearable computers.

Related Content

Artificial Intelligence in Practice
(2020). *Advancing Skill Development for Business Managers in Industry 4.0: Emerging Research and Opportunities (pp. 98-123).*
www.irma-international.org/chapter/artificial-intelligence-in-practice/245542

Emerging Challenges in Cyber Security
Pooja M. R., Gururaj H. L.and Pavan S. P. Kumar (2022). *Methods, Implementation, and Application of Cyber Security Intelligence and Analytics (pp. 25-34).*
www.irma-international.org/chapter/emerging-challenges-in-cyber-security/306857

Social Network Analytic Methods as Part of Big Data Technology for the Process of Monitoring Public Information in Indonesia: Case Study on Policy Making Process Based on Public Information Analysis
Ahmad Budi Setiawan, Amri Dunan, Karman Karmanand Bambang Mudjiyanto (2023). *Handbook of Research on Artificial Intelligence and Knowledge Management in Asia's Digital Economy (pp. 176-197).*
www.irma-international.org/chapter/social-network-analytic-methods-as-part-of-big-data-technology-for-the-process-of-monitoring-public-information-in-indonesia/314446

Deep Self-Organizing Map Neural Networks for Plantar Pressure Image Segmentation Employing Marr-Hildreth Features
Jianlin Han, Dan Wang, *Zairan Liand Fuqian Shi (2021). *International Journal of Ambient Computing and Intelligence (pp. 1-21).*
www.irma-international.org/article/deep-self-organizing-map-neural-networks-for-plantar-pressure-image-segmentation-employing-marr-hildreth-features/289623

Building New Relationships: Social Media Trustworthiness in Gulf Cooperation Countries
Afaf Mubarak Bugawaand Noora Abdulla Janahi (2020). *Implementing Computational Intelligence Techniques for Security Systems Design (pp. 230-254).*
www.irma-international.org/chapter/building-new-relationships/250615