

Session M.4: S-4 Fuzzy Rules

Location: Eden Vale C3

51: Towards Efficient Algorithms for Approximating a Fuzzy Relation by Fuzzy Rules: Case When "And"- and "Or"-Operation are Distributive

NAFIPS Peer Reviewed

*Vladik Kreinovich**, University of Texas at El Paso; *Christian Servin*, El Paso Independent School District

A generic fuzzy relation often requires too many parameters to represent – especially when we have a relation between many different quantities $x_1; \dots; x_n$. There is, however, a class of relations which require much fewer parameters to describe – namely, relations which come from fuzzy rules. It is therefore reasonable to approximate a given relation by fuzzy rules. In this paper, we explain how this can be done in an important case when “and”- and “or”-operation are distributive – and we also explain why this case is important.

77: Fuzzy Rule based Expert System to Diagnose Spinal Cord Disorders

NAFIPS Peer Reviewed

*Mohammad Hossein Fazel Zarandi**, *Saeede Rahimi Damirchi-Darasi*, Amirkabir University; *I. Burhan Turksen*, TOBB Economic and Technology University; *Mahshid Arabzadeh*, Amirkabir University

On time diagnosis of spinal cord problems is essential because of patient pain and cost of treatment. To alleviate this hazard in this research a fuzzy rule-based expert system is proposed to diagnosis spinal cord problems and clarify whether a MRI scan is necessary or not. The knowledge representation of this system is provided from high level, based on lifestyle of the patient and historical data about his/her problem and some of the clinical examination. It organized to 5 sub problem, called Red flag, Spinal stenosis, Scoliosis Lordosis kyphosis, and Mechanical and Spinal disc herniation. Spinal disc herniation is composed of 2 sub problem including Lumbar and cervical. Inference engine of the system is a combination of backward and forward chaining. To reduce diagnosis time, it switches from forward to backward mode and vice versa based on direct and indirect approach. Results of this system is the degree of each problem the patient has and it reduces complexity in image processing for analysis the M.R.I of the patient.

108: Fuzzy Rule-based Expert System for Diagnosis of Multiple Sclerosis

NAFIPS Peer Reviewed

Mahshid Arabzadeh, Amirkabir University; *Mohammad Hossein Fazel Zarandi*, *Mohammad Hossein Harirchian*, TUMS; *Saeede Rahimi Damirchi-Darasi**, Amirkabir University

Multiple Sclerosis (MS) is an autoimmune disease in which insulating covers of nerves called myelin sheath are damaged. Myelin sheath helps the transmission of the nerve impulses. Damage to the myelin in the central nervous system (CNS) disrupts the communication between the brain and spinal cord and other parts of the body, thus cause a wide range of signs and symptoms. Therefore, it can be difficult to diagnose by physicians in some cases. Recently automated systems have been introduced for the diagnosis of some of the neurological disorders including Multiple Sclerosis. An important issue that should be considered in these automated systems is the fact that diagnosis process often confront with uncertainty and vagueness. Therefore, we determine to bring these uncertainties in our system by using Fuzzy Logic, for first time. Another weakness seemed in previous works, is their knowledge bases and reasoning process. This paper presents a fuzzy rule-based expert system for MS diagnosis. Decision making in this system is performed based on the person's identity, symptoms and signs. In study of the cases mentioned, we confront with crisp variables that receive binary value. These crisp variables can lead to uncertain results. Fuzzy reasoning is used to address the uncertainties exist in diagnosis process. This system can help to non-neurologists in the diagnosis of MS or can be used as a neurologist physician assistant. The proposed system uses a spreadsheet for storing or extracting the information of the patients. System's knowledge base built based on direct approach and the inference is done using forward-chaining method because of the multiplicity of factors that refers to MS.

1.00pm Lunch

Location: Eden Vale A

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