Fuzzy and Soft Computing Digest
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Content:

1.Book:

Possibility Theory with Applications to Data Analysis

O.WOLKENHAUER, Control Systems Centre, UMIST, UK

Set theory and logic are the basic theoretical tools for modelling and reasoning. Their application to real-world problems induces various types of uncertainty related to the observation of processes, the measurement of signals and the mismatch between mathematical models and the real world in general. Possibility theory provides a framework in which all forms of uncertainty can be represented. This book reviews, extends and applies possibility theory in an integrated approach that combines probability theory, statistical analysis and fuzzy mathematics.

Special features of the book include:

- An up-to-date introduction to possibility theory.
- An integrated view on uncertainty techniques based on multi-valued mappings, fuzzy relations and random sets.
- Adoption of concepts into a temporal environment characterised by signal or data processing.
- Illustration of the application of possibility theory to data analysis in process and supervisory control systems with examples taken from the area of condition monitoring.

CONTENTS: Motivation and Methodology. Uncertainties in Control Systems. Uncertainty Techniques. Possibility Theory. Possibilistic Change Detection. Fuzzy Data Analysis. Conclusions and Perspectives. Probability Theory. Evidence Theory. Fuzzy Systems. Selected Topics. Glossary. Bibliography. Index.

READERSHIP: Postgraduate Students interested in cutting edge topics related to Fuzzy Systems; Researchers and Research Engineers in Control Engineering - specifically in the area of data analysis for condition monitoring and process control - data mining and data fusion applied to engineering problems.

RSP SERIES: UMIST Control Systems Centre Series, No. 5

SERIES EDITORS: Dr M.B. Zarrop and Professor P.E. Wellstead, UMIST, UK

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2. Tutorials:

A number of excellent lecture notes are available on Jan Jantzen site:

http://www.iau.dtu.dk/~jj/pubs/

Abstracts are in the file
http://www.iau.dtu.dk/~jj/pubs/OVERVIEW.html

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3. Articles:

3.1
Mass Assignment-based Induction of Decision Trees on Words

Baldwin, J. F., Lawry, J. and Martin, T. P.
IPMU 1998 (Paris)

A mass assignment based ID3 algorithm for the induction of decision trees on words is described. Such decision trees encode sets of qualified conditional rules on linguistic variables. The potential of this algorithm is illustrated by means of several examples relating to both real word and model classification and prediction problems.

Full paper:
http://www.fen.bris.ac.uk/engmaths/research/aigroup/martin/papers98/IPMU98.pdf

3.2
FUZZY-WAVELETS: THEORY AND APPLICATIONS

Marc Thuillard

ABSTRACT: In recent years new methods have appeared that improve the computer efficiency of multi-resolution analysis. Wavelet theory is certainly one of the most important methods. The complementarity of fuzzy logic and wavelet theory has been now recognized. This complementarity is used in so-called fuzzy-wavelets techniques. In this paper, we explain several new techniques combining fuzzy logic and wavelet theory in the domains of automatic learning, classification, spectral analysis and artificial intelligence. We present also the first commercial product, a flame detector, implementing fuzzy-wavelets techniques.

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3.3
Data Preprocessing and Intelligent Data Analysis

A. Famili, Wei-Min Shen, Richard Weber, Evangelos Simoudis

http://www-east.elsevier.com/ida/browse/96-1/auth.htm

Abstract
This paper first provides an overview of data preprocessing, focusing on problems of real world data. These are primarily problems that have to be carefully understood and solved before any data analysis process can start. The paper discusses in detail two main reasons for performing data preprocessing: (i) problems with the data and (ii) preparation for data analysis. The paper continues with details of data preprocessing techniques achieving each of the above mentioned objectives. A total of 14 techniques are discussed. Two examples of data preprocessing applications from two of the most data rich domains are given at the end. The applications are related to semiconductor manufacturing and aerospace domains where large amounts of data are available, and they are fairly reliable. Future directions and some

challenges are discussed at the end. (Intelligent Data Analysis, Vol. 1, No. 1, http://www.elsevier.com/locate/ida) c 1997 Elsevier Science Inc.

Keywords:data preprocessing, data analysis, data mining.

Full paper:
http://www-east.elsevier.com/ida/browse/96-1/ida96-1.htm

3.4
Use of DataEngine in the proactive detection of card fraud

Jens Mende - Department of Information Systems, University of the Witwatersrand, Johannesburg, South Africa

Abstract: Credit card fraud costs the banking system and the world economy billions of dollars annually. Although many different means have been tried to combat the problem, the incidence of fraud and the sophistication of criminals increases each year as classical anti-fraud measures are systematically overcome. This paper looks at various technologies useful in the identification and investigation of credit card fraud. The authors' approach is one that emphasises that real-time identification - using the infrastructure currently at the disposal of the financial sector - is not only possible but vital to ensuring success. The document further describes techniques that may be used in the investigation of credit card fraud crimes. The threat of credit card fraud demands a multidisciplinary approach in order to understand, track, investigate, analyse and ultimately to reduce the phenomenon to a level where it is no longer a threat. It is suggested that a number of seemingly disparate fields might have important inputs to understanding and dealing with the problem effectively. The problem of credit card fraud has arisen from a number of different and complex causes. Many different sciences and disciplines can therefore profitably be used to address the problem.
http://isys.wits.ac.za/

4. The applet corner (recreative!):
4.1
http://www.cs.brockport.edu/cs/javasort.html

This page provides a number of links to applets which illustrate the operation of, and complexity incurred by, several commonly-studied sorting algorithms.

4.2
http://www.netdictionary.com/index_java.html

Netdictionary is an alphabetical reference guide to technical, cultural, and humorous terms related to the Internet.