FUZZY SETS IN INFORMATION SYSTEMS

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Abstract

Fuzzy sets approaches have been applied in the database and information retrieval areas for more than thirty years. A certain degree of maturity has been reached in terms of use of fuzzy sets techniques in relational databases, object-oriented databases, information retrieval systems, geographic information systems and the systems dealing with the huge quantity of information available through the Web. Research works including database design, flexible querying, imprecise database management, digital libraries or web retrieval have been undertaken and their major outputs will be emphasized. On the other hand, aspects that seem to be promising for further research will be identified.

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Moderator: Patrick Bosc received the Ph. D degree in computer science from the University of Rennes (France) in 1978. He joined the IRISA (Institut de Recherche en Informatique et Systèmes Aléatoires) and is currently a Professor at ENSSAT (École Nationale Supérieure de Sciences Appliquées et de Technologies). His main research interests concern the roles of fuzzy sets and possibility theory in database management systems. Pr Bosc is a member of the IEEE Society and of the EUSFLAT Association aimed at the promotion of fuzzy sets in Europe. He is also a member of the Editorial Boards of *Fuzzy Sets and Systems* and the *International Journal of Uncertainty, Fuzziness and Knowledge-based Systems.*

Dr. Fred Petry received BS and MS degrees in physics and a Ph.D. in computer and information science from The Ohio State University in 1975.   He has been on the faculty of the University of Alabama in Huntsville and the Ohio State University and is currently a Full Professor in the Department of Electrical Engineering & Computer Science   at Tulane University, New

Orleans, LA. His recent research interests include representation of imprecision via fuzzy sets and rough sets in databases, GIS and other information systems, and artificial intelligence including genetic algorithms. His research has been funded by NSF, NASA, DOE, NIH, and various DOD agencies and industry and by his affiliation with the Naval Research Laboratory. He has directed 20 Ph.D. students in these areas in the past 15 years.

Dr. Petry has over 300 scientific publications including 115 journal articles/book chapters and 7 books written or edited. His monograph on fuzzy databases has been widely recognized as the definitive volume on this topic. He is currently an associate editor of IEEE Transactions on Fuzzy Systems, Neural Processing Letters and area editor of information systems for Fuzzy Sets and Systems and has been general chairperson of several international conferences. He was selected as an IEEE Fellow in 1996 for his research on the use of fuzzy sets for modeling imprecision in databases and in 2003 was made a Fellow of the International Fuzzy Systems Association. In 2002 he was chosen as the outstanding researcher of the year in the Tulane University School of Engineering and in 2004 received the Naval Research Laboratory's Berman Research Publication award.

Dr. Raghu Krishnapuram received his Ph.D. degree in electrical and computer engineering from Carnegie Mellon University, Pittsburgh, in 1987. From 1987 to 1997, he was on the faculty of the Department of Computer Engineering and Computer Science at the University of Missouri, Columbia. From 1997 to 2000, Dr. Krishnapuram was a Full Professor at the Department of Mathematical and Computer Sciences, Colorado School of Mines, Golden, Colorado. Since then, he has been at at IBM India Research Lab, New Delhi. Dr. Krishnapuram's research encompasses many aspects of fuzzy set theory, neural networks, pattern recognition, text mining, e-commercecomputer vision, and image processing, He has published over 150 papers in journals and conferences in these areas. Dr. Krishnapuram is an associate editor of the IEEE Transactions on Fuzzy systems, and he is a co-author (with J. Bezdek, J. Keller and N. Pal) of the book "Fuzzy Models and Algorithms for Pattern Recognition and Image Processing".

Masoud Nikravesh: Dr. Nikravesh is the Executive Director of BISC (Berkeley Initiative in Soft Computing), the Computer Science Division at the University of California, Berkeley. BISC is a world-leading center for basic and applied research in soft computing, computing with words (CW), computational theory of perception (CTP), common senses and human reasoning, and precisiated natural language (PNL)-computation and reasoning with information presented in natural languages. Dr. Nikravesh's main focus has been on the development of computational intelligence within the framework of soft computing (evolutionary computing including GA and DNA coding, neural network, fuzzy logic, and probabilistic reasoning). The framework has been applied for data understanding and knowledge discovery from multiple scientific domains. Dr. Nikravesh is visiting Research Scientist in the Imaging and Informatics Group at, Lawrence Berkeley National Laboratory. He is the LBNL-NERSC (National Energy Research Scientific Computing Division) representative to the DiMI- UC Discovery Program and he is member of Executive Committee and member of research council-UC Discovery program. Dr. Nikravesh has published six books and over 150 papers and presentations on a wide range of topics in artificial intelligence and soft computing. He has led a team of scholars and interacted with private and Government funding institutions to develop strategic research plans. He has served as reviewer and has been on the board of several public and private IT centers of excellence. His credentials have led to front-page news at Lawrence Berkeley National Laboratory News and headline news at the Electronics Engineering Times.

Dr. Guy DE TRE received the M.Sc. degree in computer science (Licentiate in Computer Science) from Ghent University (Belgium) in July 1994, and the Ph.D. degree in engineering from the same university in June 2000. From July 1994 to December 1995 he worked as a project engineer at Knowledge Technologies N.V., a spin-off company of the laboratory of Artificial Intelligence at the Vrije Universiteit Brussels. Since January 1996 he is employed at the Computer Science Laboratory at the Department of Telecommunications and Information Processing of Ghent University. Guy De Tré is currently doing research on information processing, with a strong emphasis on database models, which are able to cope with fuzzy

and/or uncertain information. His current research interests are: the modelling of linguistic information, object-oriented database models, spatio-temporal database models and flexible querying and answering techniques. He is (co-)author of several papers in International Journals, in Conference proceedings and in books. Guy De Tré is associate editor of Mathware and Soft Computing and reviewer for several international journals such as Fuzzy Sets and Systems, IEEE Transactions on Fuzzy Systems, and IEEE Transactions on Systems, Man, and Cybernetics.

Gabriella Pasi took her Laurea Degree in Computer Science at the Università degli Studi di Milano, Italy, and the PhD in Computer Science at the Université de Rennes, France. She worked as a researcher at the National Council of Research in Italy from April 1985 till February 2005. Actually she is Associate Professor at the Università Degli Studi di Milano Bicocca. Her research activity mainly concerns the modelling and design of *flexible* systems (i.e. systems able to manage imprecision and uncertainty) for the management and access to information, such as Information Retrieval Systems and Data Base Management Systems. She also work at the definition of techniques of Multi Criteria Decision Making and Group Decision Making.

She is a member of organizing and program committees of several international conferences. She has co-edited six books e several special issues of International Journals. She has published more than 120 papers on International Journals and Books, and on the Proceeding of International Conferences.

Since 2001 she is a member of the Editorial Board of the journals *Mathware and Soft Computing* and *ACM Applied Computing Review*.

She is coordinating the European Project *PENG* (Personalized News Content Programming). This is a STREP (Specific Targeted Research or Innovation Project), within the VI Framework Programme, Priority II, Information Society Technology.

She organized several International events among which the European Summer school in Information Retrieval (ESSIR 2000), and she co-organizes every year the track "Information Access and Retrieval" within the ACM Symposium on Applied Computing.