FUZZY LOGIC AND THE INTERNET (FLINT)

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Abstract— In coming years, the most important application area of fuzzy logic will be the Internet and, in particular, search and question-answering. During recent years, important initiatives have led to reports of connections between Fuzzy Logic and the Internet. FLINT meetings ("Fuzzy Logic and the Internet") have been organized by BISC ("Berkeley Initiative in Soft Computing").

In my view, Fuzzy Logic and Internet including the Information and Search and Internet services will be one of the most important area and field of research for fuzzy community. This area, in my view, deserve a much higher degree of attention from our fuzzy community and leaders, young researchers and our fuzzy societies such as, IFSA, NAFIPS, FuzzIEEE, EUSFLAT, IPMU, ...

I do believe that fuzzy community has resources, talent and technology to create the first real intelligent Search Engine by 2010 and the first Search Engine with high level of deduction and Q&A capability by 2012.

By 2020, Fuzzy community should be able to develop the first intelligent Q&A system.

These are exciting times in the fields of Fuzzy Logic and the Internet (FLINT), and this panel discussion will add to the excitement, as it will focus on the growing connections between these two fields.

Fuzzy Logic field has been maturing for forty years. These years have witnessed a tremendous growth in the number and variety of applications, with a real-world impact across a wide variety of domains with humanlike behavior and reasoning. And we believe that in the coming years, the Fuzzy Logic and the Internet (FLINT) will be a major field of applications of Fuzzy Logic. This panel session will discuss concepts, models, techniques and examples exhibiting the usefulness, and the necessity, of using Fuzzy Logic in the Internet mainly, Search Engine and Q&A and issues related to this field.

The initial objectives of the FLINT is to design an intelligent search engine with high WebMIQ based on the advancement in the following area:

- Add higher level deduction capability
- Precisiation of meaning
- A logic for approximate reasoning
- Information summarization
- Add content to the existing information
- Semantic Web and distributed data-based development
- Ontology development
- Moblization of the knowledge
- Web and Text Mining
- Machine-human interaction for better search and add human intelligence
- Development of web-question and answering (WQ&A)
- Search in Multi-Media
- Advances in analysis of graphs and networks
- Better targeted information delivery and services

I. PANELISTS

Prof. Lotfi A. Zadeh; BISC Director
Prof. Zadeh is a Professor in the Graduate School,Computer Science Division, Department of EECS, University of California, Berkeley. In addition, he is serving as the Director of BISC (Berkeley Initiative in Soft Computing). His earlier work was concerned in the main with systems analysis, decision analysis and information systems. His current research is focused on fuzzy logic, computing with words and soft computing. Lotfi Zadeh is a Fellow of the IEEE, AAAS, ACM, AAAI, and IFSA. He is a member of the National Academy of Engineering and a Foreign Member of the Russian Academy of Natural Sciences. He is a recipient of the IEEE Education Medal, the IEEE Richard W. Hamming Medal, the IEEE Medal of Honor, the ASME Rufus Oldenburger Medal, the B. Bolzano Medal of the Czech Academy of Sciences, the Kampe de Feriet Medal, the AACC Richard E. Bellman Central Heritage Award, the Grigore Moisil Prize, the Honda Prize, the Okawa Prize, the AIM Information Science Award, the IEEE-SMC J. P. Wohl Career Acheivement Award, the SOFT Scientific Contribution Memorial Award of the Japan Society for Fuzzy Theory, the IEEE Millennium Medal, the ACM 2000 Allen Newell Award, and other awards and honorary doctorates.

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Moderator:
Dr. Masoud Nikravesh
BISC Executive Director
and Program Manager
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.

Prof. Elie Sanchez is affiliated to the LIF, "Laboratoire d'Informatique Fondamentale de Marseille" (CNRS and University), France. He received a Ph.D. in Mathematics (Faculty of Science) and a Ph.D. in Human Biology (Faculty of Medicine), both from Aix-Marseille University. He was a former President of the International Fuzzy Systems Association (IFSA). He has been awarded the International Grigore MOISIL Gold Medal and Award and he has been elected IFSA Fellow. He is affiliated to the editorial board of 20 journals, including Fuzzy sets and Systems, Artificial intelligence in Medicine, Information Sciences, Multiple-Valued Logics, Soft Computing. Since the early seventies, when he initiated work on fuzzy relation equations, and on biomedical applications based on fuzzy logic, he published intensively on fuzzy set theory, soft computing, and related topics, including two edited volumes co-authored with Prof. L.A. Zadeh (following sabbatical years spent at UC Berkeley). His recent research interests lie on Fuzzy logic in the Semantic Web and Web Intelligence. Finally, he is serving as Editor of a Volume "Fuzzy logic and the Semantic Web" (Elsevier, to appear in late 2005 in the New Series *Capturing Intelligence*), in which participants of this panel are contributing chapter authors.

Prof. Christer Carlsson
Director of the Institute of Advanced Management Systems Research, and a professor of management science at Abo Akademi University is a member of the Steering Group of BISC/UC Berkeley (among other international duties). Professor Carlsson got his DSc (BA) from Abo Akademi University in 1977, and has lectured extensively at various universities in Europe, in the U.S., in Asia and in Australia. Professor Carlsson has organised and managed several research programs in industry in his specific research areas: mobile technology and applications, knowledge based systems, decision support systems, real options valuation and soft computing in logistics and has carried out theoretical research work also in multiple criteria optimisation and decision making, fuzzy sets and fuzzy logic, and cybernetics and systems research. Some recent research programs, which include extensive industrial cooperation, include *Smarter* (reducing fragmentation of working time with modern information technology), *SmartBulls* (reducing demand fluctuations in the supply chain with fuzzy optimisation methods and multi-agent systems), *OptionsPorts* (real options valuation of R&D portfolios and the handling of giga-investments), *Imagine21* (foresight of new telecom services using agent technology), *Chimer* (mobile platforms for sharing the cultural heritage among European school children) and *Mobile Technology Applications* (mobile value services with enabling technologies; a national Finnish research program with an international partner network in France, Germany, Hong Kong, Singapore and the USA). He is on the editorial board of several journals including the *Electronic Commerce Research and Applications*, *Fuzzy Sets and Systems, ITOR, Cybernetics and Systems, Scandinavian Journal of Management, Belgian Journal of Operational Research and Intelligent Systems in Accounting, Finance and Business* and *Group Decision and Negotiation*. He is the author of 4 books, and an editor or co-editor of 5 special issues of international journals and 12 books, and has published more than 230 papers.
His most recent monographs are *Fuzzy Reasoning in Decision Making and Optimization* (with Robert Fullér), Studies in Fuzziness and Soft Computing Series, Springer-Verlag,

Berlin/Heidelberg, 2002, and *Fuzzy Logic in Management* (with Mario Fedrizzi, Robert Fullér), Kluwer, Dordrecht 2003; two monographs are in preparation: *The Braudel Rule – Mobile Value Services* (with Peter G.W. Keen and Pirkko Walden) and *Fuzzy Decision Theory: Rigour in Support of Relevance* (with Robert Fullér and Peter Majlender).

Prof. Trevor Martin received a PhD in quantum chemistry from the University of Bristol in 1984. Since then, he has been a member of the AI group in Bristol, and is currently Professor of Artificial Intelligence. With Jim Baldwin and Bruce Pilsworth, he developed Fril, a logic programming language incorporating uncertainty, and during the 1990s he was technical director of Fril Systems Ltd. Since 2001 he has spent 80% of his time as a BT Senior Research Fellow, leading a project researching soft computing in intelligent information management including areas such as the semantic web, soft concept hierarchies and user modelling. He is a member of the editorial board of Fuzzy Sets and Systems, and has served on many conference programme and organising committees, including programme chair for the 2007 IEEE Fuzzy Systems Conference. He has published over 150 papers in refereed conferences, journals and books, and is a Chartered Engineer and member of the BCS.

Prof. Ronald R. Yager
Ronald R. Yager has published over 500 papers and fifteen books. A complete list of his publications can be found at http://www.panix.com/~yager/HP/pubs.html. He is made considerable contributions in fuzzy sets technology. He was the recent recipient of the IEEE Computational Intelligence Society Pioneer Award in Fuzzy Systems. Dr. Yager is a fellow of the IEEE, the New York Academy of Sciences and the Fuzzy Systems Association. He has served at the National Science Foundation as program director in the Information Sciences program. He was a NASA/Stanford visiting fellow and a research associate at the University of California, Berkeley. He has served as a lecturer at NATO Advanced Study Institutes. He received his undergraduate degree from the City College of New York and his Ph. D. from the Polytechnic University of New York. Currently, he is Director of the Machine Intelligence Institute and Professor of Information and Decision Technologies at Iona College. He is editor and chief of the International Journal of Intelligent Systems. He serves on the editorial board of a number of journals including the IEEE Transactions on

Fuzzy Systems, Neural Networks, Data Mining and Knowledge Discovery, IEEE Intelligent Systems, the Journal of Approximate Reasoning and the International Journal of General Systems.

Sergio Guadarrama was born in Madrid-Spain in 1975. He graduated with B.S. degree in Computer Science at the Technical University of Madrid in 1999. He obtain a Research grant for 6 moths from the Technical University of Madrid and European. After that he earn a Ph.D. Fellowship by the Education Department of Spain. Since 2000, he was a graduate student at the Department of Artificial Intelligence of the Technical University of Madrid. He received his Masters degree in Artificial Intelligence in 2002. Since August 2003 he was a visiting student researcher at the Electrical Engineering and Computer Sciences Department of the University of California, Berkeley, working in the BISC (Berkeley Initiative in Soft Computing) for 10 months. His research has been focused in the areas of Fuzzy Logic, Fuzzy Sets and Computing with Words and Perceptions. He is just finished his Ph.D. thesis, which is focused on Computing with Words and Perceptions, and obtain his Ph.D. on Computer Science in June 2007.