Mario Fedrizzi

Curriculum Vitae et Studiorum

Personal Information

Date of birth: March 28th, 1949

Place of birth: Trento**,** Italy

Nationality: Italian

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Education

1976: D.Sc in Operations Research, University of Venice, Cà Foscari, Italy.

1973: M.Sc in Mathematics, University of Padua,Italy.

1968: Scientific Maturity Baccalaureate.

Academic career

1986-today: Full professor, chair of Mathematical Methods for Economics, University of Trento (I).

1981-1986: Associate professor, University of Trento.

1976-1981: Assistant professor, University of Trento.

Academic institutional positions

2012-today: Deputy Head, Department of Industrial Engineering, University of Trento.

2004-2008 : Deputy Rector, University of Trento.

2000-2003: Member of the Founding Committee of the Faculty of Computer Science, University of Bozen, South Tirol.

1989-1995: Dean of the Faculty of Economics, University of Trento.

1990-1994: Rector's Delegate for University Information System, University of Trento.

1991-1993: Rector's Delegate for Comett European Programme, University of Trento.

1987-1990: Head of the School of Computer Science, University of Trento.
1985-1991: Head of the Institute of Informatics, Faculty of Economics, University of Trento.

Teaching experience at Bachelor and Master level

Calculus, Linear Algebra, Mathematics for Finance, Applied Operations Research, Decision Modeling, Mathematical Economics, Optimization Methods, Probability Theory and Statistics, Management Information Systems, Statistical Quality Control.

Teaching experience at Ph.D. level

Mathematical Programming, Decision Modeling under Uncertainty, Decision Support Systems, Multiple Criteria Decision Modeling, Fuzzy Sets and Systems.

Research interests

At first, research activities were focused on individual and group decision making under risk, exploring the impact of multivariate utility functions on ranking of alternatives, most of all in the framework of stochastic dominance criteria.

Then, the research interests moved to the fuzzy sets and systems theory and applications addressing most of all the modeling of multicriteria and group decision problems, and emphasizing consensual processes modeling, with applications to the valuation of very large investment projects.

Accordingly, a decision support system for ranking patents, based on multiple
experts evaluations has been created. In this approach the starting point was the creation of three value scenarios for each considered patent by each expert. These are then used for the construction of individual fuzzy pay-off distribution functions for the patent value; a consensual fuzzy pay-off distribution is then determined starting from the individual distributions. Possibilistic moments are calculated from the consensus pay-off distribution for each patent and used in ranking them with TOPSIS. It was further showed how the analytic hierarchy process (AHP) can be used to include additional decision variables into the patent selection, thus allowing for a two-tier decision making process.

The main research activities can be summarized as follows.

Consensus modeling under fuzziness

- Study of the modeling of consensus reaching in a 'soft' environment, i.e. when the individual testimonies are assumed to be expressed as fuzzy preference relations. In this approach consensus is meant as the degree to which most of the predominant experts agree on the preferences associated to most relevant alternatives.
- Extension of soft consensus to a dynamical context combining measures of collective disagreement with inertial mechanisms of opinion changing aversion. Individual preferences are transformed through an iterative process based on the gradient dynamics of a cost function.
- As an approach representative of consensus modeling in the context of Multi Expert Multi Criteria Decision Making in a linguistic setting, a model has been developed aiming at computing a consensus degree for a fuzzy majority of the experts on each of the considered alternatives. The group of experts judges each alternative according to the evaluation of a finite set of predefined criteria. Each expert is asked to linguistically evaluate each alternative in terms of its performance with respect to each criterion. The experts are also allowed to associate a distinct importance to the criteria in a linguistic form as well.

  The models and systems developed have been applied to evaluation of quality services in health care systems, to environmental planning, to medical diagnosis, and to the evaluation of large investment projects.

Fuzzy adjacency relations in social network analysis (SNA)

- The imprecision permeating the relationships between the nodes of a social network is modelled using fuzzy binary adjacency relations and then higher dimensional fuzzy m-ary adjacency relations are constructed from the binary relations by means of OWA (Ordered Weighted Average) aggregation functions. This allows to characterize the attitude of the actors to connect each other moving continuously from non-compensatory to full-compensatory situations.
- The model is then extended by assuming that adjacency relations between decision makers are derived from their preferences on a set of alternatives, so that adjacency relations explicitly represent the grade of agreement between the decision makers. The flexible

method proposed for deriving the adjacency relations makes possible to model different decision problems, taking care of the different weights associated to the various decision makers.

- Assuming that decision makers are represented by nodes in a social network, we weights them endogenously through centrality measure, a core concept in SNA used to describe a wide spectrum of theoretical issues ranging from importance to influence to leadership. To this aim the eigenvector centrality is chosen, in analogy to Google's PageRank algorithm, since this centrality measure is particularly suitable to quantify the influence of the network nodes and therefore to be used in a decision making context.

Fraud detection under uncertainty

- We show how to use the Choquet integral to extend the OWA-based attack tree approach to fraud detection assuming that the attack tree is valuated recursively through a bottom-up algorithm whose complexity is linear versus the number of nodes and exponential for every node. Then, the algorithm is further extended assuming that the attribute values in the leaves are unimodal *LR* fuzzy numbers and the calculation of Choquet integral is based on alpha-cuts.
- Design and implementation of a prototype of multi-agent system called Fraud Interactive Decision Expert System (FIDES), focused on the evaluation of behavioral aspects of fraud detection according to the judgments expressed by two groups of experts, inspectors and auditors respectively. FIDES combines think-maps, attack trees and fuzzy numbers under a Delphi-based team work support system and offers to the users a suitable way to better understand and manage fraud schemes.

Valuation of giga-investment projects

- A decision support system for ranking patents, based on multiple experts evaluations is been introduced. In this approach the starting point is the creation of three value scenarios for each considered patent by each expert. These are then used for the construction of individual fuzzy pay-off distribution functions for the patent value; a consensual fuzzy pay-off distribution is then determined starting from the individual distributions. Possibilistic moments are calculated from the consensus pay-off distribution for each patent and used in ranking them with TOPSIS. Then, it is showed how the analytic hierarchy process (AHP)

can be used to include additional decision variables into the patent selection, thus allowing for a two-tier decision making process.

- We examine how a group of experts estimates the risk of a giga-investment assuming that individual risks are allocated in a Pareto-efficient way in the group. We illustrate how, in the presence of imprecise, vague, and even incomplete information, it is possible to create credible and relevant estimates for giga-investment risks and to diversify them (thus enabling the very existence of these large risky investments). From the possibilistic risk aversion theory the main contribution consists in introducing a totally new representation of group risk premium depending on individual possibilistic risk premiums.

Research visiting positions

Lappeenranta University of Technology, Lappeenranta (Finland), Summer 2012, Spring 2013, Summer 2014, Autumn 2015.

Åbo Akademi University, Turku (Finland), January-September 2009, January-June 2010.

Auckland University of Technology, Auckland (New Zealand), Summer 2008 and 2010.

University of Granada, Granada (Spain), Spring 1990 and 1992.

Eötvös Lorand University, Budapest (Hungary), Summer 1990.

System Research Institute, Polish Academy of Sciences, Warsaw (Poland), Spring 1985, Fall 1988.

Academic professional experience

2012-today: member of the advisory board of IPMU (Information Processing and Management of Uncertainty).

2009-today: member of steering committee of eBEREA, international EU-China research staff exchange program, Marie Curie actions.

2007-today: docent, Faculty of Technology, Åbo Akademi University, Turku, Finland.

2007-2010: member of the steering committee of FiDiPro (Finland Distinguished Professor Program) chair at IAMSR, Åbo Akademi University, Turku, Finland.

2006-today: international advisory board member, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland.

2006-today: international advisory board member, KEDRI, Auckland University of Technology, New Zealand.

1995-2000: steering committee of ERUDIT (European Network on Fuzzy Logic and Uncertainty

Modelling in Information Technology), Aachen, Germany.

Member of the editorial board of journals

Control and Cybernetics, Springer-Verlag.
Group Decision and Negotiation, Springer Netherlands.
International Journal of General Systems, Taylor & Francis (till 2012).
International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, World Scientific.
Applied Computational Intelligence and Soft Computing, Hindawi Publishing Corporation.
Archives for the Philosophy and History of Soft Computing, Published online by the European Centre of Soft Computing.
Journal of Real Options, Published online.

Reviewer of journals

Annals of Operations Research, European Journal of Operational Research, Expert Systems with Applications, Fuzzy Optimization and Decision Making, Fuzzy Sets and Systems, Group Decisions and Negotiation, IEEE Transactions on Systems, Man and Cybernetic, IEEE Transactions on Fuzzy Systems, Information Fusion, Information Sciences, International Journal of Information Technology & Decision Making, International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems, Mathematical and Computer Modeling, Omega.

Member of the program committee of international conferences

MEPP '91 (Eckero, Finland), MEPP '92 (Marienham, Finland), IPMU '92 (Palma de Mallorca, Spain), Fuzzy-IEEE '92 (San Diego, USA), Fuzzy-IEEE '93 (San Francisco, USA), FLAI '93 (Linz, Austria), EUFIT '93, '94, '95, '96, '97, '98 (Aachen, Germany), IPMU '98 (Paris, France), IFSA '99 (Taiwan, R.O.C), 6th Fuzzy Days 1999 (Dortmund, Germany), Fuzzy-IEEE '99 (Seoul, Korea), International Workshop on Preferences and Decisions 1997, 1998, 2000, 2003, 2009 (Trento, Italy), IPMU 2000 (Madrid, Spain), ANNES' 2001 (Dunedin, New Zealand), 7th Fuzzy Days (Dortmund, Germany), IPMU 2002 (Annecy, France), IPMU 2004 (Perugia, Italy), NCEI 2004 (Auckland, New Zealand), IPMU 2006 (Paris, France), 9th Fuzzy Days 2006 (Dortmund, Germany), EUSFLAT 2007 (Ostrava, Czech Republic), ICONIP'08 (Auckland, New Zealand), 2009 IEEE/WIC/ACM (Milan, Italy), 2010 IEEE/WIC/ACM (Toronto, Canada), ICAOR'10 (Turku, Finland), QL&SC2010 (Xiamen, China), ITBI-10 (Nagpur, India), EUROFUSE 2011 (Regua, Portugal), IPMU 2012

(Catania, Italy), ICAOR'12 (Bankok, Thailand), EUSFLAT '13 (Milan, Italy), ICAOR '13 (Lisbon, Portugal), FORS40 (Lappeenranta, Finland).

Company administration

2004-2006: member of the audit committee of Unicredit Banca S.p.A. (the largest retail bank in Italy).

2002-2006: member of the board of directors of Unicredit Banca S.p.A.

2001-2004: chairman of the board of directors of Iniziative Urbane S.p.A. (a real estate company involved in the urban renovation of the city of Trento, Italy).

1997-2006: member of the board of directors of Cedacri S.p.A. (the largest Italian outsourcer of banking information systems).

1997-2000: member of the board of directors of Mediocredito Trentino Alto Adige Bank.

1995-2002: chairman of the board of directors of Caritro Bank (the largest bank in Trentino Region, Italy).

1988-1994: member of the board directors of Informatica Trentina S.p. A. (the company in charge of the information system of Provincia Autonoma di Trento, Italy).

Consulting activities

He has been a consultant for several organizations, his experience includes quality control, management information systems, decision support systems, expert systems, financial planning, risk management.

Honors and awards

2012-First Class Knight of the Order of Lion of Finland

2006-Distinguished Scientist Award, KEDRI Institute, Auckland University of Technology, NZ

1989-Diplom for Best Paper of the Year, System Research Institute, Polish Academy of Science

1988-Diplom for Best Paper of the Year, System Research Institute, Polish Academy of Science

Known languages

Italian (mother tongue)

English

German (scholastic knowledge)