

10:29AM *How to Estimate Expected Shortfall When Probabilities Are Known with Interval or Fuzzy Uncertainty* [#15149]

Christian Servin, Hung Nguyen and Vladik Kreinovich, El Paso Community College, United States; New Mexico State University, United States; University of Texas at El Paso, United States

To gauge the risk corresponding to a possible disaster, it is important to know both the probability of this disaster and the expected damage caused by such potential disaster ("expected shortfall"). Both these measures of risk are easy to estimate in the ideal case, when we know the exact probabilities of different disaster strengths. In practice, however, we usually only have a partial information about these probabilities: we may have an interval (or, more generally, fuzzy) uncertainty about these probabilities. In this paper, we show how to efficiently estimate the expected shortfall under such interval and/or fuzzy uncertainty.

10:48AM *Some Results on Fuzzy congruence relations in pseudo BE-algebras* [#15125]

Akbar Rezaei, Arsham Boruman Saeid and Roohallah Daneshpayeh, Department of Mathematics, Payame Noor University, P. O. Box. 19395-3697, Tehran, Iran, Iran; Department of Mathematics and Faculty of Mathematics and Computer, Shahid Bahonar University of Kerman, Kerman, Iran, Iran; Department of Mathematics, Payame Noor University, P. O. Box. 19395-3697, Tehran, Iran, Iran

In this paper, the concept of fuzzy congruence relation on a pseudo BE-algebra is state and get some properties. We show that the set of fuzzy congruence relations of a pseudo BE-algebra is a complete lattice. Moreover, the quotient structure induced by fuzzy congruence relations are studied.

11:06AM *Toward the Existence of Solutions of Fractional Sequential Differential Equations with Uncertainty* [#15315]

Soheil Salahshour, Ali Ahmadian, Chee Seng Chan and Dumitru Baleanu, Islamic Azad University, Iran; University of Malaya, Malaysia; Cankaya University, Turkey

The main study of this paper is focused on the solutions of a class of fuzzy sequential fractional differential equations in the form of

$\$left(_{OD_x^{\beta}} yright)^{\prime}(x)=b(x)y(x)\$, where \$left(_{OD_x^{\beta}} yright)(x)\$ is the fuzzy Riemann-Liouville derivative of order \$\beta\$, in (0,1)\$. On this subject, a new fuzzy complete metric space is introduced. Finally, we proof the existence and uniqueness of our solution using the contraction principle.$

11:24AM *Circumcenter of Centroid in Ranking Fuzzy Number: A case of generalized trapezoidal fuzzy numbers* [#15219]

Lazim Abdullah and Fateen Najwa Azman, University Malaysia Terengganu, Malaysia

Many approaches have been proposed to quest appropriate methods in ranking fuzzy numbers. Due to the flexibility of fuzzy numbers, most of these methods are not able to calculate all kinds of ranking fuzzy numbers and some of them give inconsistent and counter intuitive results. As a result, the final ranking sometimes fails to discriminate fuzzy numbers effectively. This paper aims to propose a new method for ranking fuzzy numbers using the circumcenter of centroid with the hope to reduce the problem of indiscriminate in the ranking. The new method mainly considers the distance, the spread, the height and the area of fuzzy numbers to compute the ranking order. The calculation for the new method is derived from generalized trapezoidal fuzzy numbers and circumcenter concepts. A numerical example is given to illustrate the calculation more explicitly.

11:42AM *On Arithmetic Operations of G-Number* [#15041]

Daud Mohamad and Noor Aida Mohamad Rofai, Universiti Teknologi MARA, Malaysia

Heterogeneity in decision making evaluation is inevitable due to different background, preference and experience of decision makers. One aspect of the heterogeneity can be the type of numerical scale used in the evaluation such as crisp, interval, fuzzy and the most recent is the z-number. The calculation will be simpler if these different scales can be represented in a single form. A general form of uncertain number known as granular number or simply denoted as G-number have been introduced to cater the problem. At present, two basic operations, which are the addition and multiplication have been given and implemented in AHP method and Dijkstra's algorithm. Nevertheless, in order to be further useful in some other decision making models, it is essential to introduce the other two arithmetic operations, which are the subtraction and division. In this paper, the negation and the reciprocal of G-number is determined in order to obtain the subtraction and division operations. Some numerical examples and the general formula are given at the end of the paper.

Methods and Applications of Fuzzy Cognitive Maps II

Wednesday, August 5, 10:10AM-12:00PM, Room: Galata, Chair: Elpiniki Papageorgiou

10:10AM *Hybrid Dynamic Fuzzy Cognitive Maps Evolution for Autonomous Navigation System* [#15093]

Marcio Mendonca, Valeria Arruda, Ivan Chrun and Esdras Silva, Federal Technological University Pr-Cp/Ct, Brazil; Federal Technological University Pr-Ct, Brazil

This work develops a knowledge-based system to autonomous navigation using Fuzzy Cognitive Maps (FCM). A new variant of FCM, named Dynamic-Fuzzy Cognitive Maps (D-FCM), is used to model decision tasks and/or to make inference into a mobile navigation context. Fuzzy Cognitive Maps are a tool that model qualitative structured knowledge through concepts and causal relationships. The proposed model allows representing the dynamic behavior of a mobile robot in presence of environment changes. A brief review of correlated works in the navigation area by use of FCM evolutions is presented. Some simulation results are discussed and compared with Weighted Fuzzy System for shows the ability of the mobile to navigate among obstacles in different scenarios (navigation environment).

10:29AM *Employing Fuzzy Cognitive Maps to Support Environmental Policy Development.* [#15258]

Asmaa Mourhir, Tajjeeddine Rachidi and Mohammed Karim, Al Akhawayn University in Ifrane, Morocco; Sidi Mohammed Ben Abdellah University, Fes, Morocco

Environmental problems are complex in nature and are usually exacerbated by unsustainable trends that are driven by anthropogenic, economic and development factors. One of the key challenges of sustainability is the ability to examine the range of possible future paths of combined social and environmental conditions, under consideration of human perceptions, uncertainty and cause-effect factors, with possible feedback. Moreover, policy formulation and evaluation need to be addressed in an integrated and holistic way, where scoping goes beyond specific sectorial interests and includes multi-disciplinary knowledge, involving stakeholders from diverse backgrounds and with different objectives and aspirations. In this work we describe FCMP, a Fuzzy Cognitive Mapping methodology to help experts and lay experts develop, simulate and assess the impact of different policy alternatives on key

www.fuzzieee2015.org



Istanbul
FUZZ-IEEE 2015

**IEEE International
Conference**

on Fuzzy Systems

August 2-5, 2015

Istanbul, TURKEY



IEEE
Computational
Intelligence
Society

Program & Abstracts