A Special Session on

Fuzzy transforms: theory and applications to data analysis and processing

organized by IrinaPerfilieva, Jin Hee Yoon

Fuzzy (F)-transforms successfully link various transforms (Fourier, Laplace, integral, Wavelet, etc.) with fuzzy approximation models. The general idea is to bring an original model into a special space where succeeding computations are easier. In particular, the F-transform transforms an infinitary object (a real function) into a finitary one (a finite vector). Another specific feature of the F-transform consists in including a fuzzy partition in its formal representation.

In the recent ten years, the theory of F-transform became an important constituent in the field of computational intelligence. It has a well-justified theory and many sophisticated applications in image, signal and time series processing. Moreover, it can be successfully used in numerical methods for differential and integro-differential equations including the case when uncertainty is included in their formulation. The exceptional feature of the F-transform is that it successively and efficiently copes with classical problems as well as with problems that are affected by uncertainty or vagueness.

In image and signal processing, the F-transform effectively solves problems connected with up-(down-) scaling, reconstruction, edge detection, fusion, registration, etc. In time series analysis, the F-transform is used for trend extraction. In big data area, it works as a successful method of pattern recognition.

The F-transform propagates usefulness and effectiveness of fuzzy methods on all levels of data processing.

Objectives and topics:

The aim of this special session is to present recent developments and trends in the theory and applications of the F-transform, including all mentioned above. Beside theoretical aspects, the session will be focused on advanced applications in data analysis including handling big data.

We invite contributions that extend traditional ways of data analysis and propose adequate methods for various kinds of data processing including, but not limited to the following topics:

- Theoretical aspects of the F-transform and its higher degree versions,
- Inverse F-transform and how to improve its approximation quality,
- Numerical methods on the basis of F-transform,
- Big data processing on the basis of the F-transform,
- Time series analysis and forecasting including:
time series trend extraction, local trend estimation and their models,
- fuzzy time series, granular time series and their models,
- forecasting methods: regression, fuzzy regression, fuzzy/linguistic IF-THEN rules.

**Short biography of the organizer(s) and contact information:**

**IrinaPerfilieva**

Professor Irina Perfilieva, Ph.D., received the degrees of M.S. (1975) and Ph.D (1980) in Applied Mathematics from the Lomonosov State University in Moscow, Russia. At present, she is a full professor of Applied Mathematics in the University of Ostrava, Czech Republic. At the same time she is a head of Theoretical Research Department in the University of Ostrava, Institute for Research and Applications of Fuzzy Modeling. She is the author and co-author of four books on mathematical principles of fuzzy sets and fuzzy logic, the co-editor of one book and many special issues of scientific journals. She has published over 250 papers in the area of multi-valued logic, fuzzy logic, fuzzy approximation and fuzzy relation equations. She is a member of editorial boards of the following journals:

- Int. Journal of Fuzzy Sets and Systems,
- Transactions on Fuzzy Systems,
- Journal of Applied Computational Intelligence,
- Iranian Journal of Fuzzy Systems,
- Journal of Uncertain Systems,
- International Journal of Computational Intelligence Systems,
- Journal of Intelligent technologies and applied statistics,
- Journal of Uncertainty in Mathematics Science,
- Journal of Fuzzy Information and Engineering.

She works as a member of Program Committees of the most prestigious International Conferences and Congresses in the area of fuzzy and knowledge-based systems. For her long-term scientific achievements she was awarded on the International FLINS 2010 Conference on Foundations and Applications of Computational Intelligence. She received the first memorial Da Ruan award at FLINS 2012. In 2013, she was elected as an EUSFLAT Honorary Member. She got a special price of the Seoul International Inventions Fair 2010. She has two patents in the area of time series processing and the Internet service technique. Her scientific interests lie in the area of mathematical modeling and image processing, where she successfully uses modern as well as classical approaches.

**Jin Hee Yoon**

Jin Hee Yoon, Ph.D., received the degrees of B.S, M.S. and Ph.D (1980) in Mathematics at Yonsei University, Seoul, South Korea. Currently, she is a visiting professor of School of Mathematics and Statistics in Sejong University of Seoul, South Korea. She has been working as a organizer and committee of several international conferences, also has been working as an editor of some international journals including prestigious journal. She is going to be listed in *Marquis Who’s who in*
the world, 2015. Also, she got awarded for Outstanding keynote speech at 11th Iranian Conference on Intelligent Systems (ICIS2013). Her research interests are Fuzzy time series, Forecasting based on F-transform, Fuzzy regression, Financial forecasting.

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**Important Dates**

- Paper submission **February 8, 2015**
- Notification of acceptance for papers **March 23, 2015**
- Camera-ready paper submission **April 21, 2015**
- Early registration deadline **April 23, 2015**
- Conference **August 2-5, 2015**

**Submission of the papers**

Please submit your papers for this special session to both the organizers and conference online submission system (http://fuzzieee2015.org/) by indicating the title of the special session.