

lexical-based approach and then use the machine learning approach on this corpus for creating the classification model. This approach allows classifying the messages into positive or negative classes, without having to annotate manually a training corpus.

## Representing Hypoexponential Distributions in Continuous Time Bayesian Networks

*Manxia Liu, Fabio Stella, Arjen Hommersom and Peter J.F. Lucas*

Continuous time Bayesian networks offer a compact representation for modeling structured stochastic processes that evolve over continuous time. In these models, the time duration that a variable stays in a state until a transition occurs is assumed to be exponentially distributed. In real-world scenarios, however, this assumption is rarely satisfied, in particular when describing more complex temporal processes. To relax this assumption, we propose an extension to support the modeling of the transitioning time as a hypoexponential distribution by introducing an additional hidden variable. Using such an approach, we also allow CTBNs to obtain *memory*, which is lacking in standard CTBNs. The parameter estimation in the proposed models is transformed into a learning task in their equivalent Markovian models.

## Axiomatic of Inverse Lattice-valued F-transform

*Jiří Močkoř*

Axioms of two versions of inverse fuzzy transformation systems are introduced, and it is proved that a transformation function satisfies these axioms if and only if it is an upper or lower inverse lattice-valued F-transform with respect to a fuzzy partition. Categories of inverse transformation systems are introduced, and it is proved that these categories are isomorphic to the category of spaces with fuzzy partitions.

## Why Triangular Membership Functions Are Often Efficient in F-Transform Applications: Relation to Probabilistic and Interval Uncertainty and to Haar Wavelets

*Olga Kosheleva and Vladik Kreinovich*

Fuzzy techniques describe expert opinions. At first glance, we would therefore expect that the more accurately the corresponding membership functions describe the expert's opinions, the better the corresponding results. In practice,

however, contrary to these expectations, the simplest – and not very accurate – triangular membership functions often work the best. In this paper, on the example of the use of membership functions in F-transform techniques, we provide a possible theoretical explanation for this surprising empirical phenomenon.

## Enhanced F-transform exemplar based image inpainting

*Pavel Vlašánek*

This paper focuses on a completion of the partially damaged image. There are a variety of techniques to deal with this task. Our contribution belongs to the group of exemplar based image inpainting techniques which process the image what was separated to the many small regions. The regions are called patches and the task of inpainting becomes the task of searching for the most suitable patch from the undamaged part of the image to replace the partially damaged one. Our novelty is in processing based on fuzzy mathematics and new filling order prioritization function.

## Missing data imputation by LOLIMOT and FSVM/FSVR algorithms with a novel approach: A Comparative Study

*Fatemeh Fazlikhani, Pegah Motakefi and Mir Mohsen Pedram*

Missing values occurrence is an inherent part of collecting data sets in real world's problems. This issue, causes lots of ambiguities in data analysis while processing data sets. Therefore, implementing methods which can handle missing data issues are critical in many fields, in order to providing accurate, efficient and valid analysis.

In this paper, we proposed a novel preprocessing approach that estimates and imputes missing values in datasets by using LOLIMOT and FSVM/FSVR algorithms, which are state-of-the-art algorithms. Classification accuracy, is a scale for comparing precision and efficiency of presented approach with some other well-known methods. Obtained results, show that proposed approach is the most accurate one.



**BOOK OF ABSTRACTS**



**17<sup>th</sup> International Conference on Information Processing and Management of  
Uncertainty in Knowledge-Based Systems – IPMU 2018**

Cádiz, Spain, June 11<sup>th</sup> – 15<sup>th</sup>, 2018

**Editors**

M. Eugenia Cornejo, Jesús Medina, Eloísa Ramírez-Poussa

**Associate Editors**

María José Benítez-Caballero, Juan Carlos Díaz-Moreno,  
Roberto García-Aragón, David Lobo

ISBN 978-84-09-02893-1

@Copyright 2018 IPMU