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Call for Papers on the Special Issue

"On-Line Fuzzy Machine Learning and Data Mining"

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Aims and Scope

The application of Fuzzy Sets and Fuzzy Logic in the field of machine learning (ML) and data mining (DM) has become more visible and attractive. The relevance of these theories is motivated by their power of handling situations involving partial truth and imprecision, which often underlie the data and its summarization in the form of factual knowledge. Fuzzy theories provide a valuable background for devising strategies and solutions to several uncertainty facets in data analysis. They represent a substantial potential for extending and improving existing data analysis methodologies. To name some generalizations, consider fuzzy extensions of rule-based systems, decision trees, association rules, dependencies, etc. Among others, important modeling aspects like kernels, preferences, ranking and data fusion are particularly suitable for the application of fuzzy methods. Hence, extending conventional ML and DM techniques with fuzzy capabilities may lead to higher understandability and interpretability of data and models. Moreover, in situations involving partial truth and imprecision fuzzy methods can produce accurate learning models. Thus, ML and DM equipped with fuzzy concepts can offer another dimension for reasoning about data and knowledge.

This special issue intends to investigate the **relationship between fuzzy set theory and ML/DM** with special emphasis on (but not restricted to) a particular class of approaches within the field of Fuzzy ML-DM **dealing with on-line, incremental learning methods**. The aim is to investigate **incremental adaptation of the model parameters and the evolution of the model** as cornerstone elements of techniques dedicated to **dynamically changing environments** over time and space. Typically, data streaming exemplifies dynamic systems (with changing operation conditions and system characteristics) which can be found in various industrial and rich-data applications (e.g. control, robotics, web, etc.). Fuzzy learning models for such systems depart from the idea that memory cannot suffice to handle all data in a one-shot experiment (e.g. in the case of huge data bases or web applications). Data is therefore segmented and processed sequentially and incrementally in an online way. In pure online applications, individual data samples arrive over time requiring again incremental processing. This special issue intends to draw a picture of the recent advances in **fuzzy online learning as a bridge between online ML and DM on one side and fuzzy theory on the other side.**

Topics

Topics of interest include but not limited to novel techniques in:

- **Online incremental fuzzy machine learning and fuzzy pattern recognition**, e.g.
  - Online/Incremental fuzzy decision trees
  - Online/incremental fuzzy kernel based approaches
  - Online/incremental fuzzy SVMs
  - Online/incremental fuzzy Bayes classifiers
  - Online fuzzy instance-based learners
  - Online/incremental fuzzy clustering

- **Fuzzy sets and methods in incremental data mining**, e.g.
  - Active and semi-supervised learning strategies
  - Techniques to address “Concept Drift”

- Online/Incremental Feature Selection
- Online tuning via human-machine interaction
- Adaptive Data pre-processing
- Interactive data mining

- **Evolving fuzzy systems (fuzzy systems incrementally learned from data)** including:
  - Evolving fuzzy classifiers
  - Evolving Takagi-Sugeno-Kang fuzzy systems
  - Evolving neuro-fuzzy approaches
  - Evolving fuzzy controllers
  - Stability, process-safety and computational related aspects
  - Interpretability issues

- **Real-world applications of online fuzzy machine learning and data mining**
  - Online modelling and identification
  - Online fault detection and decision support systems
  - Online media classification
  - Smart systems
  - Robotics
  - Applications of DM and ML in huge data bases
  - Web applications
  - Finance, etc.

Important dates

Submission deadline: **November 30, 2010**
First author notification: March 31, 2011
Revised version: June 30, 2011
Final notification: August 31, 2011
Publication: Autumn 2011

Submission Instructions

Papers will be evaluated based on their originality, presentation as well as relevance and contribution to the field of on-line fuzzy machine learning and data mining, suitability to the special issue, and overall quality. All papers will be rigorously refereed by 3 peer reviewers. Submission of a manuscript to this special issue implies that no similar paper is already accepted or will be submitted to any other conference or journal. Authors should consult the "Guide for Authors", which is available online at http://www.elsevier.com/wps/find/journaldescription.cws_home/505730/authorinstructions, for information about preparation of their manuscripts. Manuscripts should be submitted via the Elsevier Editorial System http://ees.elsevier.com/ins/. Please choose "**Spec.Iss.: On-Line Fuzzy ML and DM**" when specifying the Article Type.