

## Special Session Call for Papers

### **Special Session on Adaptive Data-Driven Modeling in Dynamic Environments and On-line Processes**

International Conference on Machine Learning and Applications

ICMLA2014

Detroit, U.S.A. December 3-6, 2014

<http://www.icmla-conference.org/icmla14/>

#### **AIMS AND SCOPE**

The computerization of many life activities and the advances in data collection and storage technology lead to obtain mountains of data. They are collected to capture information about a phenomena or a process behavior. These data are rarely of direct benefit. Thus, a set of techniques and tools are used to extract useful information for decision support, prediction, exploration and understanding of phenomena governing the data sources. The information is mostly provided in terms of system models describing the behaviour of the actual system or application under examination.

Whenever dynamic process changes occur due to changing system states, varying operation modes, or environmental conditions, the information content extracted from older (batch off-line) data sources needs to be adjusted; otherwise, the models may deteriorate significantly in performance. In on-line settings, this circumstance requires permanent updates of model components and parameters, in off-line applications a transfer of old models to new states.

Therefore, adaptive and dynamic data-driven learning methodologies play an important role, as they are able to cope with dynamically and continuously evolving environments in order to keep the quality of the system models permanently up-to-date and on a high level. In particular, the methodologies typically employed are able to adjust the models to new system states and operation modes on-the-fly. Incremental learning concepts and evolution of model components play a key role during model adaptation in order to avoid time-intensive re-training phases. Thus, the models equipped with these technologies are also often called evolving models or in a broader sense evolving intelligent systems.

Important issues in these evolving learning mechanisms are dealing with upcoming drifts appropriately (achieving a reasonable balance between continuous learning and “forgetting”), keeping the supervision effort of operators at a low level, dealing with high-dimensional learning problems (omitting curse of dimensionality) as well as allowing a fast processing (by e.g. keeping the complexity of the models low).

This special session looks to gather and discuss efficient techniques, methods and tools able to manage, to exploit and to interpret correctly the increasing amount of data in environments and continuously changing system behaviors. Thereby, the ultimate goal is to extract models from (on-line) measurement data which are flexible in the sense to dynamically and self-automatically adjust themselves to actual states.

#### **TOPICS**

This session would solicit original research papers including but not limited to the following:

- Incremental learning methods,
- Adaptive, life-long and sequential learning,
- On-line classification and regression methods,
- Evolving structural components and systems modelling
- Incremental, evolving un-supervised methods
- Incremental/on-line Dimension reduction methods
- Concepts to address drifts and shifts in data streams (weighting, gradual forgetting etc.)

- On-line complexity reduction, merging and splitting concepts
- On-line/Incremental Active and Semi-supervised learning concepts
- On-line Human-machine interaction and the incorporation of background knowledge
- Transfer learning
- Adaptive data pre-processing and knowledge discovery
- Applications in the field of dynamic, on-line, incremental learning such as
  - On-Line Modeling and System Identification
  - Dynamic Time Series Prediction
  - Data Stream Mining and Adaptive Knowledge Discovery
  - Smart Evolving Sensors
  - Robotics, Intelligent Transport and Advanced Manufacturing
  - Advanced Communications and Multi-Media Applications
  - Bioinformatics and Medicine
  - On-line Quality Control and Fault Diagnosis
  - Condition Monitoring Systems
  - Adaptive Evolving Controller Design
  - User Activities Recognition
  - Huge Database and Web Mining
  - Visual Inspection and Image Classification
  - Cloud Computing
  - Multiple Sensor Networks
  - Query Systems and Social Networks
  - Assisted Ambient Intelligence

## IMPORTANT DATES

Paper Submission Deadline:	August 6 <sup>th</sup> , 2014
Notification of acceptance:	September 7 <sup>th</sup> , 2014
Camera-ready papers & Pre-registration:	October 1 <sup>st</sup> , 2014
The ICMLA Conference:	December 3 <sup>rd</sup> , 2014

This special session will be held as part of the ICMLA'14 conference. Authors should submit papers through the main conference submission website. Papers must correspond to the requirements detailed in the instructions to authors. All conference submissions will be handled electronically. Detailed instructions for submitting the papers are provided on the conference home page at:

<http://www.icmla-conference.org/icmla14/>

Accepted papers should be presented by one of the authors to be published in the conference proceeding. If you have any questions, do not hesitate to direct your questions to the session organizers.

## SPECIAL SESSION ORGANIZERS:

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- Edwin Lughofer (Johannes Kepler University Linz, Department of Knowledge-Based Mathematical Systems, Austria, [edwin.lughofer@jku.at](mailto:edwin.lughofer@jku.at) , Webpage: <http://www.flll.jku.at/staff/edwin>)

**PRELIMINARY PROGRAM COMMITTEE MEMBERS (TO BE CONFIRMED):**

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