Special Session

Title: **Autonomous Learning from Big Data**

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The aim of the special session is to present latest results in this fast expanding area of Autonomous Learning Systems and Big Data Analytics and to give a forum to discuss the challenges for the future.

It is organised by the new Special Interest Group on Autonomous Learning Systems and the Section on Big Data Analytics within INNS and by the Technical Committee on Evolving Intelligent Systems, SMC Society, IEEE and aims to be a focal point of the latest research in this emerging area.

One of the important research challenges today is to cope effectively and efficiently with the ever growing amount of data that is being exponentially produced by sensors, Internet activity, nature and society. To deal with this ocean of zeta-bytes of data and data streams and navigate to the small islands of human-interpretable knowledge and information requires new types of analytics approaches and autonomous learning systems and processes.

Traditionally, for decades or even centuries, machine learning, AI and cognitive science were developed with the assumption that the data available to test and validate the hypotheses is a small, finite volume and can be processed iteratively and offline. The realities of dynamically evolving big data streams and big data sets (e.g. pentabytes of data from retail industry, high frequency trading, genomics or other areas) become more prominent only during the last decade or so. This poses new challenges and requires new, revolutionary approaches.

Topics of interest (include but not limited to):

Methodology

- Autonomous, online, incremental learning – theory, algorithms and applications in big data
- High dimensional data, feature selection, feature transformation – theory, algorithms and applications for big data
- Scalable algorithms for big data
- Learning algorithms for high-velocity streaming data
- Kernel methods and statistical learning theory
- Big data streams analytics
- Deep neural network learning
- Machine vision and big data
- Brain-machine interfaces and big data
- Cognitive modeling and big data
- Embodied robotics and big data

- Fuzzy systems and big data
- Evolutionary systems and big data
- Evolving systems for big data analytics
- Neuromorphic hardware for scalable machine learning
- Parallel and distributed computing for big data analytics (cloud, map-reduce, etc.)
- New Adaptive and Evolving Learning Methods
- Autonomous Learning Systems
- Stability, Robustness, Unlearning Effects
- Structure Flexibility and Robustness in Evolving Systems
- Evolving in Dynamic Environments
- Drift and Shift in Data Streams
- Self-monitoring Evolving Systems
- Evolving Decision Systems
- Evolving Perceptions
- Self-organising Systems
- Neural Networks with Evolving Structure
- Non-stationary Time Series Prediction with Evolving Systems
- Automatic Novelty Detection in Evolving Systems
- On-Line Identification of Fuzzy Systems
- Evolving Neuro-fuzzy Systems
- Evolving Clustering Methods
- Evolving Fuzzy Rule-based Classifiers
- Evolving Regression-based Classifiers
- Evolving Intelligent Systems for Time Series Prediction
- Evolving Intelligent System State Monitoring and Prognostics Methods
- Evolving Intelligent Controllers
- Evolving Fuzzy Decision Support Systems
- Evolving Probabilistic Models
- Big data and collective intelligence/collaborative learning
- Big data and hybrid systems
- Big data and self-aware systems
- Big Data and infrastructure
- Big data analytics and healthcare/medical applications
- Big data analytics and energy systems/smart grids
- Big data analytics and transportation systems
- Big data analytics in large sensor networks
- Big data and machine learning in computational biology, bioinformatics
- Recommendation systems/collaborative filtering for big data
- Big data visualization
- Online multimedia/ stream/ text analytics
- Link and graph mining
- Big data and cloud computing, large scale stream processing on the cloud

Real-life applications

- Robotics
- Defence
- Intelligent Transport
- Bio-Informatics
- Industrial Applications
- Data Mining and Knowledge Discovery
- Control Systems

- Evolving Consumer Behaviour
- Evolving Activities Recognition
- Evolving Self-localisation Systems

Dates:

- Send Title & Abstract to p.angelov@lancaster.ac.uk or ASIM.ROY@asu.edu   as soon as possible
- Deadline for Paper Submission   15 January, 2015
- Notification of Acceptance   15 March, 2015
- Final Paper Submission   15 April, 2015

Selected authors will be invited to submit extended papers for a **special issue of the Springer journal** Evolving Systems