Tutorial on *Learning Autonomously from Big Data*

Where: tbc
When: July 12, 2015. tbc

- **Organizers**: Dr. Plamen Angelov, Prof. @ Lancaster University, UK, and Dr. Asim Roy, Prof. @ Arizona State University

- **Bios**: Plamen Angelov (M'99-SM'04) is a Chair Professor in Intelligent Systems and Data Science Group Leader at Lancaster University, UK. He is also Honorary Professor at the Technical University of Sofia, Bulgaria and Chair of Excellence 2015 in Carlos III University, Madrid, Spain. Prof. Angelov is member of the Board of Governors of IEEE SMC Society and INNS. Plamen has 25+ years of professional experience in high level research and an active research portfolio in the area of computational intelligence, machine learning and world leading results in online and evolving learning and algorithms for knowledge extraction in the form of human-intelligible fuzzy rule-based systems. He has published over 200 peer-reviewed journals and conference papers and two research monographs with 3800+ citations. He received 4 best paper awards (2006, 2009, 2012, 2013), 'The Engineer Innovation and Technology Special Award' (2008) IEEE and INNS award 'For Outstanding Services' (2013). He is the founding co-Editor-in-Chief of Springer's journal *Evolving Systems* and Associate Editor of *IEEE on Cybernetics* and *IEEE Transactions on Fuzzy Systems and 5 other journals.* Plamen is the founding Chair of the TC on Evolving Intelligent Systems, SMC Society and a member of several other TCs. He was also chairing the TC on Standards, CIS (2010-2012) and is the founding Chair of the Task Force (TF) on *Evolving and Adaptive Fuzzy Systems*, Fuzzy Systems TC and vice-chair of the Evolving Neural Networks TF, NN TC, CIS and a member of several TFs. Plamen is the founding General co-Chair of annual IEEE conferences on *Evolving and Adaptive Intelligent Systems* sponsored by SMC. He was a member of IPC/TPC of 50+ IEEE conferences and delivered tutorials, organized special sessions and workshops at many IEEE Conferences.

- Asim Roy, Ph.D. is a Professor of Information Systems at Arizona State University. He earned his B.E. in Mechanical Engineering from Calcutta University, India, his M.S. in Operations Research from Case Western Reserve University, Cleveland, Ohio, and his Ph.D. in Operations Research from University of Texas at Austin. He also studied Industrial Engineering at Rutgers University, New Brunswick, New Jersey. He has been a Visiting Scholar at Stanford University, visiting Professor David Rumelhart in the Psychology Department, and a Visiting Scientist at the Robotics and Intelligent Systems Group at Oak Ridge National Laboratory, Oak Ridge, Tennessee. Asim is on the Governing Board of the International Neural Network Society (INNS) and the founder and chair of two INNS Sections, one on Autonomous Learning and the other on Big Data Analytics. He was the Guest Editor-in-Chief of a special issue of *Neural Networks* on autonomous learning and currently the one on big data analytics. He also serves on the editorial boards of *Neural Networks* and *Neural Information Processing — Letters and Reviews*. He has been the Letters Editor of *IEEE Transactions on Neural Networks* and has served on organizing committees of many scientific conferences. He is the General Co-Chair of the INNS Conference on Big Data 2015. He was the Program Chair for the ORSA/TIMS (Operations Research Society of America / The Institute of Management Sciences) National meeting in Las Vegas and the General Chair of the ORSA/TIMS National meeting in Phoenix. Asim is listed in *Who's Who in America*. His research interests are in theories of the brain, brain-like learning, artificial neural networks, automated machine learning, data mining, pattern recognition, prediction and forecasting, intelligent systems and nonlinear multiple objective optimization. His research has been published in *Management Science*, *Decision Sciences*, *Mathematical Programming*, *Financial Management*, *Neural Networks*, *Neural Computation*, *Naval Research Logistics*, *ORSA Journal on Computing*, *IEEE Transactions*

on Neural Networks, *IEEE Transactions on Fuzzy Systems*, *IEEE Transactions on Systems, Man and Cybernetics*, *Frontiers in Cognitive Science*, and other journals.

- **Abstract**: 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, 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.
- **Context**: This tutorial is timely, in view of the recent investments in Big Data and Data Science in general, including UK £42M Alan Turing Institute. Traditionally, for decades or even centuries machine learning, AI, 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 to be covered:**
  1. Autonomous, online, incremental learning – theory, algorithms and applications in big data
  2. Learning algorithms for high-velocity streaming data
  3. Big data streams analytics
  4. Machine vision and big data

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