Machine Learning in Manufacturing Summer School: Addressing the challenges of Industry 4.0

Venue: Warwick Manufacturing Group, University of Warwick, Coventry.

Date: Tuesday, 12th September lunch time – Friday, 15th September lunch time.

Organisers: Professor Darek Ceglarek, University of Warwick and Dr Rajesh Ransing, Swansea University.

Sponsors: The summer school is funded by Connected Everything: Industrial Systems in the Digital Age, the EPSRC Funded Network Plus and kindly sponsored by Natural Computing Applications Forum (NCAF) and Neural Computing and Applications (NC&A) Journal.

Aim: Industry 4.0, Digital Manufacturing, Big Data Analytics have created new opportunities for cross fertilisation of machine learning and manufacturing streams. The objective of this summer school is to bring together research students and early career researchers in statistics, machine learning and data mining community with interest in manufacturing as well as manufacturing researchers who want to see how information technology and artificial intelligence can help them. The summer school wants to bring these interdisciplinary teams together.

We are looking for machine learning opportunities offered by following themes, but of course, we are not limited by them.

1. Predictive Analytics and Data Visualisation in Manufacturing
2. Supply Chain Management and Connected Enterprise
3. Automated Inspection and Image Processing
4. Human-Robot and Robot-Robot Interactions

Why Should I attend? Leading experts from manufacturing industries will speak on the current challenges they are facing in their journey towards Industry 4.0. They will identify expectations from machine learning community and present number of inspiring and thought provoking case studies. In addition, there will be group discussions, hands on examples on industrially relevant problems, mock EPSRC style panel review meeting.
**Summer School Competition:** A chance to win £1000 prize, sponsored by the Neural Computing and Applications Journal, on the Uni-pol Challenge on data analytics and machine learning. This is an opportunity for machine learning experts to make a difference. The competition is only open to summer school participants. The details will be announced in the summer school.

**Speakers:**

1. *Interactive Session: What is I.4.0 compliant environment for traditional manufacturing industries: The IT-OT Gap, Customer Expectations, Quality Standards, Robust designs and Processes.* Dr Steve Leyland, Group Technical Director, Uni-pol Group, Southampton.
2. *Announcement of the Uni-pol Challenge, Opportunity to win NC&A journal £1000 prize for summer school participants.*
3. *Probabilistic modelling for risk analysis and condition monitoring,* Professor Ian Nabney, Aston University
   Bayesian belief networks to model risk at the design stage: Rolls-Royce turbines
   Time-frequency analysis and non-linear switching state-space models; extreme value theory for novelty detection: Agusta Westland monitoring of helicopter airframes (healthcare examples)
4. *Data visualisation – representing high-dimensional data in 2D,* Professor Ian Nabney, Aston University
   Probabilistic models (Generative Topographic Mapping) and topographic models (Neuroscale). Applications to Agusta Westland vibration data and Wheelright tyre pressure measurement
5. Maintenance Management in flexible production lines, Silvia Cisotto, BMW Hams Hall, Coleshill.
6. *Interactive Session: Why Industrial Data is so special and why deep investigation and analytics is needed before machine learning can be applied efficiently.* Philippe Saad, Director Big Data Analytics, ESI Group, France.
7. The challenge of making Cybersecurity efficient from an industrial point of view, Philippe Saad, ESI Group, France.
8. Interactive session: Opportunities and challenges in applying machine learning techniques in supply chain, Andy Birtwistle, Director, Supply Chain Analytics, Concentra, London.

**What about costs?** The summer school has **20 fully funded** (accommodation, registration and dinner/lunches costs) **scholarships** sponsored by the EPSRC Nework Plus. Up to 10 candidates will receive partial scholarship to cover registration, lunch and dinner expenses kindly sponsored by NC&A and NCAF.

**How do I apply?** Research students/early career researchers need to submit 200 words summary of their research interests and 100 word summary of how attending this summer school is beneficial. Every participant will be required to bring a poster and a special issue of Neural Computing and Applications Journal is also being planned subsequent to this summer school to recognise best poster contributions.

**Submit Expression of Interest form:** Details of how to apply for a place at Summer School, can be found at [http://ncaf.org.uk/](http://ncaf.org.uk/) .