Special Session

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Session Organisers

Prof Saeid Nahavandi, Deakin University, saeid.nahavandi@deakin.edu.au

Saeid Nahavandi received a Ph.D. from Durham University, U.K. in 1991. He is an Alfred Deakin Professor, Pro Vice-Chancellor, Chair of Engineering, and the Founding Director of the Institute for Intelligent Systems Research and Innovation at Deakin University. His research interests include modelling of complex systems, robotics and haptics. Professor Nahavandi is Editor-In-Chief: IEEE SMC Magazine, the Senior Associate Editor: IEEE Systems Journal, Associate Editor of IEEE Transactions on Systems, Man and Cybernetics: Systems, and IEEE Press Editorial Board member. Professor Nahavandi is a Fellow of IEEE (FIEEE), Engineers Australia (FIEAust), the Institution of Engineering and Technology (FIET). Saeid is a Fellow of the Australian Academy of Technology and Engineering (ATSE). He has published more than 800 journal and conference papers.

A/Prof Abbas Khosravi, Deakin University, abbas.khosravi@deakin.edu.au

Abbas Khosravi received his PhD from Deakin University in 2010. He is currently an associate professor with the Institute for Intelligent Systems Research and Innovation at Deakin University. His current research interests include machine learning, artificial intelligence, and their applications for data mining, computer vision, optimization, and operation planning. He has received several prestigious grants to conduct fundamental and applied research in the field of AI-based uncertainty quantification. He has published more than 200 journal and conference papers and his h-index is 37 based on Google Scholar.

Prof Amir F Atiya, Cairo University, Egypt, amir@alumni.caltech.edu

Amir Atiya received his B.S. and M.S. degrees from Cairo University, and the M.S. and Ph.D. degrees from Caltech (California Institute of Technology), all in electrical engineering. Amir Atiya is currently a Professor at the Department of Computer Engineering, Faculty of Engineering, Cairo University, where he has been a faculty member since 1993. He received recently the Egyptian State Appreciation Award for 2017, the Egyptian State Distinction Award for 2010, the highly regarded Kuwait Prize for 2005, and the Young Investigator Award from the International Neural Network Society in 1996. Amir Atiya has had research contributions in the areas of in machine learning, neural networks, time series forecasting, natural language processing, and pattern classification. His work has been cited over 7800 times and has an H-index of 41. He is currently on the editorial board of several scientific journals.

Special Session Title
Uncertainty Estimation: Theories and Applications

Special Session Description
How confident is a neural network model about its prediction? How much can one trust predictions of neural networks for new samples? How can one develop neural networks that *know when they do not know*? Answering these questions is a prerequisite for widespread deployment of neural networks in safety critical applications. The field of uncertainty quantification of neural networks has received huge attention in recent years from both academia and industry. Several methods and frameworks have been proposed in literature to generate predictive uncertainty estimates using neural networks. There are currently theoretical gaps and practical issues with proposed frameworks for uncertainty estimation using neural networks. Also, the research on the application of predictive uncertainty estimates for developing uncertainty-aware systems is still rare.

The goal of this special session is to provide an in-depth discussion of the latest academic and industrial research findings of uncertainty estimation using neural networks. The session will get together prominent and upcoming scientists conducting research in this field. Topics of interest include, but are not limited to:

- Uncertainty estimation for different neural network types (feedforward, CNN, recurrent, LSTM, encoders, etc)
- Probabilistic forecasting
- Bayesian methods for uncertainty quantification
- Ensemble-based uncertainty estimation
- Sampling-free methods for uncertainty estimation
- Objective evaluation of uncertainty estimates
- Design of uncertainty-aware/averse systems
- Applications of predictive uncertainty estimate (industry, engineering, robotics, medical, finance, etc)

Potential Contributors
- Prof Nahavandi and A/Prof Khosravi from Deakin University
- Prof Dipti Srinivasan from National University of Singapore
- A/Prof Yarin Gal from Oxford University
- Dr Hao Quan, Nanjing University of Science and Technology
- Researchers from Google conducting research on deep uncertainty quantification
- Researchers from University of Queensland (Australia) conducting research on renewable energies
- Researchers conducting research in the area of probabilistic forecasting (University of Montreal)
- Researcher conducting research in the area of probabilistic classification (University of Cambridge)