

## **Title of the proposed special session:**

# **Incremental Self-Organising Networks**

### **Name(s) of organizer(s):**

A/Prof Saman Halgamuge, University of Melbourne

Dr Arthur Hsu, University of Melbourne

Dr Daminda Alahakoon, Monash University

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### **Webpage of organizer(s):**

[http://www.mame.mu.oz.au/people/staff/saman\\_halgamuge.html](http://www.mame.mu.oz.au/people/staff/saman_halgamuge.html)

<http://www.bsys.monash.edu.au/staff/dalahakoon/default.htm>

### **Topic of interest:**

The aim of this special session is to report new developments, both in algorithms and application, of the incremental self-organising networks, which is a family of variants of the Kohonen's Self-Organising Maps (SOM) belonging to the incremental self-organising networks. The well known examples are Dynamic Self-Organising Maps, Growing Self-Organising Maps, Growing Cell Structure, Growing Neural Gas, Incremental Grid Growing and Growing Grid. The known application areas of those networks include:

Bioinformatics

Mechatronics and Manufacturing

Hardware Implementations

Sensor Networks

Text analysis and mining

Information Visualization

Data mining and Knowledge Discovery

Coordination of Software Agents

### **Expected outcome:**

After this special session, we expect researchers who work on the area of incremental self-organising networks to build up contacts, exchange opinions and explore new avenues of

application. The end result will greatly enhance the collaboration of researchers in this field.

**Format:**

At least 6 papers are to be presented in the proposed special session, each occupying approximately 25 minutes (20 minutes presentation and 5 minutes for discussion and questions), i.e. a minimum of 2.5 hours. We are already aware of 4 possible submissions to the special sessions, and we will seek the few more papers before sending them to reviewers.

**Organizers' biography:**

A/Prof Saman Halgamuge is working in Bioengineering and Mechatronics groups at University of Melbourne. He is a APNNA board member, and was the Program Co-Chair of ICONIP in 1999. He obtained his PhD in Computer Engineering from Darmstadt University in 1995 and since then worked in Australia in Computational Intelligence, Mechatronics and Bioengineering research. He has published about 150 research papers and participated in about 50 conferences as a program committee member, and 4 conferences as a Program Co-Chair.

Dr. Arthur Hsu is a research fellow in Bioengineering and Mechatronics groups at University of Melbourne. He received his PhD in Engineering from University of Melbourne in 2005. He has authored and co-authored many research papers relating to incremental self-organising networks. His current research areas involve image processing, bioinformatics and data mining.

Dr. Daminda Alahakoon is a senior lecturer in the Clayton School of Information Technology, Monash University. He obtained a PhD in Computer Science from Monash University in 2000. His current research interests include Structure adapting/evolving neural networks, data mining and analysis, artificial neural networks, Human cognition and adaptive intelligent systems. He has authored and co-authored over 60 research papers. Before joining Monash he has held positions as Accountant, Credit Officer and Data Mining Specialist in IT and financial organisations in Sri Lanka, Australia and The Netherlands.

**A list of related journal publications of the organizers include:**

1. S. M. Guru, A. Hsu, S.K. Halgamuge and S. Fernando, An Extended Growing Self-Organising Map For Selection of Clustering in Sensor Networks, (accepted), International Journal of Distributed Sensor Networks, Taylor & Francis, Vol 1, No 2, 2005
2. S. Patchararungruang, S.K. Halgamuge and N. Shenoy, Optimized Rule-Based Delay Proportion Adjustment for Proportional Differentiated Services, IEEE Journal on Selected Areas in Communications (Special Issue

- on Intelligent Services and Applications in Next generation networks), Feb 2005, Vol 23, No 2, IEEE Press.
3. R. Koggalage, S. K. Halgamuge and A. Hsu, Unsupervised Class Discovery and Feature Selection using an Improved Hierarchical Dynamic Self-Organizing Map, Neural Information Processing Letters and Reviews, KAIST Press, Vol 2, No 4, 2004.
  4. A. Hsu and S. Tang and S. K. Halgamuge, An Unsupervised Hierarchical Dynamic Self-Organising Approach to Class Discovery and Marker Gene Identification in Microarray Data, Bioinformatics, Oxford University Press, November 2003
  5. A. Hsu and S. K. Halgamuge. Enhancement of Topology Preservation and Hierarchical Dynamic Self-Organising Maps for Data Visualisation, Elsevier, Vol 32, No 2-3, Feb 2003.
  6. D. Alahakoon, S. K. Halgamuge, and B. Srinivasan. Dynamic Self Organising Maps with Controlled Growth for Knowledge Discovery (Special Issue in Data Mining). IEEE Transactions on Neural Networks, May 2000 [32 journal citations].
  7. B. Chang and S. K. Halgamuge. Protein Motif Extraction with Neuro-Fuzzy Optimisation. Bioinformatics, Oxford University Press, 18(8), 2002
  8. Alahakoon, D., *Controlling the Spread of Dynamic Self Organising Maps* in the journal Neural Computing and Applications, Vol 13, No 2, pp 168-174, (Springer Verlag), 2004
  9. Wickramasinghe, L.K. and Alahakoon, L.D., *Dynamic Self Organizing Maps for Discovery and Sharing of Knowledge in Multi Agent Systems* in Web Intelligence and Agent Systems: An International Journal, (IOS Press), Vol.3, No.1, 2005.
  10. Wickramasinghe, L.K., Amarasiri, R. and Alahakoon, L.D., *A Hybrid Intelligent Multi-agent System for e-Business* in Computational Intelligence Journal, pp 603 – 623, Vol 20, No 4, Blackwell Publishing Inc., 2004
  11. A. Ratnaweera, S. K. Halgamuge and H. C. Watson, Self-Organizing Hierarchical Particle Swarm Optimizer with time varying acceleration coefficients, IEEE Transactions on Evolutionary Computation June 2004, IEEE Press.

### **Recommended Reviewers:**

### **Special Session Organisers**

Dr. Daminda Alahakoon, Monash University (Algorithms, Data mining, text analysis)

Dr Arthur Hsu (Algorithms, Bioinformatics, Image Processing)

A/Prof Saman Halgamuge (Algorithms, Bioinformatics, Mechatronics and Manufacturing)

**In addition to the three organizers, we nominate**

Prof Rudolf Kruse, University of Magdeburg (Algorithms)

Prof Andreas Nuerenberger, University of Magdeburg (Algorithms)

Dr Bill Chang, University of Melbourne

Dr D. M. G. Preethichandra, Kiyushu, (Sensor Networks, Hardware)