



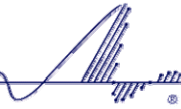
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I sastanka IEEE SCG CI / CAS-SP Chapter-a

## **Analysis, design, and selected applications of multiple winners-take-all networks**

Predavač

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### **Abstract:**

As an extension of winner-takes-all to multiple selections,  $K$ -Winners take-all (KWTA) is a fundamental operation with widespread applications in sorting, filtering, decoding, clustering, classification, and so on. In this talk, the KWTA problem is formulated as several optimization problems with reducing complexity. Several recurrent neural networks will be presented for solving the formulated problem. In particular, a novel KWTA network with a single state variable and a Heaviside step activation function will be presented. The KWTA network is shown to be globally convergent in finite time. Derived lower and bounds of the convergence time will be discussed. In addition, the initial state estimation will also be delineated for expedition of the process. Extensive simulation results will be delineated and applications to parallel sorting and rank-order filtering will be discussed.

### **About speaker:**

JUN WANG is a Professor and the Director of Computational Intelligence Laboratory in the Department of Mechanical and Automation Engineering at the Chinese University of Hong Kong. Prior to this position, he held various academic positions at Dalian University of Technology, Case Western Reserve University, and University of North Dakota. Besides, he also held various short-term visiting positions at USAF Armstrong Laboratory (1995), REKEN Brain Science Institute (2001), Universite Catholique de Louvain (2001), Chinese Academy of Sciences (2002), and Huazhong University of Science and Technology (2006-2007). He also holds a Cheung Kong Chair Professorship in computer science and engineering at Shanghai Jiao Tong University since 2008. He received a B.S. degree in electrical engineering and an M.S. degree in systems engineering from Dalian University of Technology, Dalian, China. He received his Ph.D. degree in systems engineering from Case Western Reserve University, Cleveland, Ohio, USA. His current research interests include neural networks and their applications. He published over 140 journal papers, 11 book chapters, 8 edited books, and numerous conference papers in the areas. He is an Associate Editor of the *IEEE Transactions on Neural Networks* since 1999 and *IEEE Transactions on Systems, Man, and Cybernetics – Part B* since 2003, a member of the Editorial Advisory Board of the *International Journal of Neural System* since 2006. He also served as an Associate Editor of the *IEEE Transactions on Systems, Man, and Cybernetics – Part C* (2002-2005), a guest editor of the special issue of *European Journal of Operational Research* (1996), *International Journal of Neural Systems* (2007), and *Neurocomputing* (2008). He was an organizer of several international conferences such as the General Chair of the 13th International Conference on Neural Information Processing (2006) and the 2008 IEEE World Congress on Computational Intelligence. He served as the President of Asia Pacific Neural Network Assembly in 2006 and as a member of several IEEE technical committees over the years. He is an IEEE Fellow.

For more details see <http://www.mae.cuhk.edu.hk/~jwang>

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