SUAREM KALIA

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ACADEMIC PROFILE

- **B.E** in Electrical and Electronics Engineering from Bharathiyar University, Tamilnadu, India, 1999.
- **M.E (Control and Dynamics)** in Aerospace Engineering from the Indian Institute of Science, Bangalore, India, 2001.
- **Ph.D** in Engineering from the Indian Institute of Science, Bangalore, India, 2005.
    - **Thesis Title:** Novel concepts in divisible load scheduling with realistic system constraints

PROFESSIONAL ACTIVITIES

- **AIAA Member**, (December 2005, till date)
- **Member, IEEE,** IEEE-computer society
- **Editorial Board**, Journal of Ubicoutous Computing and Technology (www.juct.org)
- **Editorial Board** in Special Issue on "Applications and Security Services in Web and Pervasive Environments" in Int. Journal of Intelligent Automation and Soft Computing.
- Refereed in the following international journals and conferences:
    - IEEE Trans. on Neural Network, Neuro-Computing, Control Engineering Practice, Journal of Computer Science and Technology, International Journal of Aerospace Engineering.

INTERNATIONAL COLLABORATIONS

- Department of Civil Engineering, University of Waterloo, Canada, (April 2007).
- Graduate School of Information Management and Security, Korea University, Seoul (Feb, 2007 and May 2007).
- Department of Aerospace Engineering, Indian Institute of Science, India.

PROFESSIONAL EXPERIENCE

- **2007 August** onwards European Research Consortium for Informatics and Mathematics (ERCIM) "Alain Bensoussan" Fellow in Institute National Research Information and Automation (INRIA), Sophia-Antipolis, France.
- **2005 to 2007 July**, Post-Doctoral Fellow in School of Electrical and Electronics Engineering, Nanyang Technological University, Singapore.
- **2001 to 2003**, Consultant in Transoft Int. Pvt. Ltd, Bangalore, India.

DETAILS OF WORK:

2007 onwards   Development of learning based computer vision platforms: learning system for tracking, and automatic activity recognition and interpretations. The objective is to design a system based on knowledge representation (objects or scenes or events), learning and reasoning techniques. Planning to use some of machine learning and multi-agent systems concepts for this purpose.

2006 – 2007:   Working as a research fellow in the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. This work involves developing an automated video surveillance for security. The most critical module in automated surveillance is 'object tracking', which facilitates high-level understanding of the video content. The major challenge in object tracking is the ability to handle the time varying characteristic of the object. This work is focusing on development of new algorithm, which adapts the object model online to handle the change in object dynamics. Here, we use neural classifier to identify the object/background and use the posterior probability map to localize the object in the subsequent frames.

2005 – 2006 March: Research fellow in the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. During this period, I was involved in developing a new classifier model to handle fewer samples and high imbalance in the training set. For this purpose, we propose risk sensitive hinge loss function. Also, the classifier finds optimal number of neurons using an adding-pruning criterion. The performance of proposed algorithm is tested with many benchmark datasets and practical problems such as image quality estimation.

2001 – 2003 July: During my doctoral research, worked as a consultant (Parallel Computing) at Transoft Int. Pvt. Ltd. Bangalore. Heading a group of 4 software engineers was fully responsible in design and development of parallel version of fluid dynamic software and developed an 8-processor Linux cluster.

MAIN STREAM RESEARCH INTERESTS

Learning algorithms: Design learning algorithms that learn to understand and extract the information from the data to solve challenging real-world applications such as aerospace, computer vision, bio-

informatics. Machine learning, artificial intelligence, relational learning and reinforcement learning for information retrieval/extraction

Optimization: Develop exact and approximate methods and evaluate the performance of the methods to solve multi-objective NP-hard optimization problems from different fields. Adapt robust, biologically inspired systems and evolutionary theory to understand complex optimization problems. Applications: nonlinear programming for trajectory optimization of multi-stage launch vehicle, composite design, feature selection.

Adaptive system research, emphasis on techniques that will allow the creation of systems that are more adaptive to changes in their environment and changes in their own capabilities. Applications: Nonlinear adaptive flight control system, smart structural system, adaptive visual tracking system, fault-tolerant control and active vision control system.

Parallel and distributed computing, scheduling algorithms for jobs in various distributed systems – type of networks, communication type, system constraints and nonlinear loads. Multimedia scheduling and VoD/MoD systems, Long duration movie rendering on delay sensitive systems

ACTIVE SECONDARY RESEARCH INTERESTS

Multimedia and its applications, object detections using machine learning, image reconstruction, object tracking and behavior analysis, knowledge based system, image/video quality estimation and cognitive vision.

Interactive digital media- media reusability, storage and retrieval for interactive digital media, catching and storage in WWW.

Information security, security engineering, visual secret sharing schemes for secure banking and copyright protection.

Multi-Agent systems, negotiation model, co-operative systems, air-traffic control.

Unmanned aerial vehicles – development of fixed wing aircraft, rotorcraft and flapping wing vehicle, Vertical take-off flight, flight control system, fault tolerant control.

TEACHING EXPERIENCE

1. **Neural Networks and its Engineering Applications** for graduate students in Indian Institute of Science, Bangalore India
2. **Knowledge Engineering** for under graduates in Bangalore university, India
3. **Biologically Inspired Computing** to under graduate students at Nanyang Technological University, Singapore.
4. Series of lectures on **Advances in Learning Systems for Multi-media Applications** at Indian Institute of Science, Bangalore, India.
5. Series of lectures on **Security Engineering** at Korea University, Seoul.

PUBLICATIONS

Book Chapter:

1. S. Suresh, N. Sundararajan, and P. Saratchandran, Recent Developments in Multi-Category Neural Classifier, Machine Learning Research, Nova Publisher, USA, 2007.

International Journals:

1. B. S. Narendra, P.V. Sivapullaiah, S. Suresh and S. N. Omkar, Prediction of Unconfined Compressive Strength of Soft Grounds using Computational Intelligence Techniques: A Comparative Study, *Computers and Geotechnics*, 33(3), 196-208, 2006. [**SCI-E**](IF 0.573)

2. S. Suresh, S. N. Omkar, V. Mani, and N. Sundararajan, Nonlinear Adaptive Neural Controller for Unstable Aircraft, *Journal of Guidance Control and Dynamics*, 28(6), 1103-1111, 2005. [**SCI**](IF 0.946)

3. D. Roy Mahapatra, S. Suresh, S. N. Omkar, and S. G. Gopalakrishnan, Estimation of degraded composite laminate properties using acoustic wave propagation model and a reduction prediction network, *Engineering Computations*, 22(7), 849-876, 2005. [**SCI-E**](IF 0.705)

4. S. Suresh, S. N. Omkar and V. Mani, Parallel Implementation of Back-Propagation Algorithm in Networks of Workstations, *IEEE Trans. on Parallel and Distributed Systems*, 16(1), 24-34, Jan., 2005. [**SCI**](IF 1.462)

5. S. Suresh, V. Mani, S. N. Omkar and H. J. Kim, An Equivalent Network for Divisible Load Scheduling in Non-Blocking Mode of Communication, *Computers and Mathematics with Application*, 49(10), 1421-1431, 2005. [**SCI**](IF 0.611)

6. S. Suresh, V. Mani, S. N. Omkar, and H. J. Kim, Parallel Video Processing using Divisible Load Scheduling, *Journal of Broadcast Engineering*, 10(1), 83-102, 2005.

7. A. K. Sarkar, S. Suresh and S. Vathsal, Target Acceleration Estimation from Radar using Neural Networks, *Defense Science Journal*, 55(3), 313-328, 2005. [**SCI-E**]

8. S. Suresh, S. N. Omkar, R. Ganguli and V. Mani, Identification of Crack Location and Depth in a Cantilever Beam using a Modular Neural Network Approach, *Smart Materials and Structures*, 13(4), 907-915, 2004. [**SCI**](IF 1.510)

9. A. K. Garg, D. Roy Mahaptra, S. Suresh, S. Gopalakrishnan and S. N. Omkar, Estimation of Composite Damage Model Parameters Using Spectral Finite Element and Neural Network, *Composite Science and Technology*, 64(16), 2477-2494, 2004. [**SCI**] (IF 2.027)

10. S. Suresh, S. N. Omkar,V. Mani and C. Menaka, Classification of Acoustic Emission Signal using Genetic Programming, *Journal of Aerospace Science and Technology*, 56(1), 26-41, 2004. [**SCI**](0.771)

11. S. Suresh, S. N. Omkar, V. Mani, and T. N. Guruprakash, Lift Coefficient Prediction at High Angle of Attack using Recurrent Neural Networks, *Aerospace Science and Technology*, 7(8), 595-602, 2003. [**SCI-E**](IF 0.479)

12. S. Suresh, V. Mani and S. N. Omkar, The Effect of Start-up in Scheduling Divisible Loads on Bus Networks: An Alternate Approach, *Computers and Mathematics with Applications*, 46(10), 1545-1557, 2003. [**SCI**](IF 0.611)

13. S. Suresh, S. N. Omkar and V. Mani, Parallel Implementation of Memory Neuron Network for Dynamical System Identification, *Advances in Vibration Engineering*, 2(2), 1-9, 2003.

14. S. N. Omkar, S. Suresh and N. Kannan, Identification of Micro-Air Vehicle Dynamics using Neural Networks: A Comparative Study, *Journal of Aeronautical Society of India*, 53(3), 139-145, 2001.

1. S. Saraswathi, S. Suresh, and N. Sundararajan, An Improved Gene Selection Method for Accurate

Invited Talks

1. Adaptive Flight Control at Indian Institute of Science, 2006.