

**HEGGERE S.RANGANATH**  
**Professor and Chair**  
**Computer Science Department**  
**The University of Alabama in Huntsville**  
**Huntsville, AL 35899**

**EDUCATION**

Auburn University, Auburn, Alabama, Ph.D. in Electrical Engineering, 1980.

The University of Louisville, Louisville, Kentucky, MS in Electrical Engineering, 1977.

Birla Institute of Technology and Science, Pilani, India, MS in Electrical Engineering, 1974.

Bangalore University, Bangalore, India, BS in Electrical Engineering, 1972.

**EMPLOYMENT**

2002 – Present, Professor and Chair, Computer Science Department, The University of Alabama in Huntsville, Huntsville, Alabama.

2000 – 2002, Professor, Computer Science Department, The University of Alabama in Huntsville, Huntsville, Alabama.

**AREAS OF TEACHING AND RESEARCH INTERESTS**

Machine Learning, Image Processing, Artificial Neural Networks, Data Science

**GRANTS AND CONTRACTS**

Defense Intelligence Agency grant, “Establishing an Intelligence Community Center for Academic Excellence (ICCAE) Critical Technology Studies Program (CTSP) in Alabama”, Investigator (Dr. Graves – PI), \$2 Million, September 2018 – August 2021.

ESI Corporation contract, “Development of Algorithms for Engineering Applications”, \$240K, Principal Investigator, August 2010 – August 2013.

Software Engineering Directorate contract, “Data Compression, Representation, and Analysis”, \$230K, Principal Investigator, August 2011-August 2012

Software Engineering Directorate contract, “Time Series Analysis Algorithms”, \$45,900, Principal Investigator, January 2010-August 2010

SBIR Contracts, “Development of Pulse Coupled Neural Network Chip”, three phase 1 and two Phase 2 contracts, \$2,000,000, Consultant, participated in proposal writing and directed research on chip design and fabrication effort for SY Technology, Huntsville, AL, 2002-2007.

NASA contract, "Automated Identification of Morphological Signatures in Global Auroral Images", \$327,000, Co-Principal Investigator, March 1997 - March 2000

### **COURSES TAUGHT**

Graduate: Machine Learning, Digital Image Processing, Artificial Neural Networks.

Undergraduate: Data Structures, Design and Analysis of Algorithms, Computer Architecture.

### **Ph.D. DISSERTATIONS SUPERVISED**

Richard Green, "Scene knowledge representation for expert vision systems", Computer Science Department, UAH, 1989

Chih-Cheng Hung, "Knowledge based image segmentation", Computer Science Department, UAH, 1990

Laurie Chipman, "A graph theoretic approach to scene matching", Computer Science Department, UAH, 1990.

Govindaraj Kuntimad, "Pulse coupled neural networks for image processing", Computer Science Department, UAH, 1995

Derek Kerstetter, "Detection and resolution of learning conflict in backpropagation network", Computer Science Department, UAH, 1997

John Rushing, "Using association rules for texture characterization", Computer Science Department, UAH, 1999

David Nabor, "A new approach for the detection of open and closed curves in binary images", Computer Science Department, UAH, 2005

Soo Kim, "Spatial reasoning methods for image understanding", Computer Science Department, UAH, 2007

Vineetha Bettaiah, "The piecewise linear approximation for time series matching" Computer Science Department, UAH, 2014

### **SELECTED PUBLICATIONS**

#### ***Refereed Journal Papers***

Shivapuja, Bettaiah, Raya, **Ranganath**, "Rotation independent hierarchical representation for open and closed curves and its applications", *GSTF International Journal on Computing*, Feb. 2011, Vo. 1, Num. 2, pp. 46-51.

**Ranganath**, Bhatnagar, "Image segmentation using two-layer pulse coupled neural network with inhibitory linking field", *GSTF International Journal on Computing*, Feb. 2011, Vo. 1, Num. 2,

pp. 29-34.

J. Rushing, **H. Ranganath**, T. Hinke and S. Graves, "Image Segmentation Using Association Rules Features", IEEE Transactions on Image Processing, 558-568, vol.11, May 2002.

J. Rushing, **H. Ranganath**, T. Hinke and S. Graves, "Using Association Rules as Texture Features", IEEE Transactions on Pattern Analysis and Machine Intelligence, 845-858, vol.23, August 2001.

**H. S. Ranganath** and G. Kuntimad, " Perfect image segmentation using Pulse coupled neural networks", Special issue of IEEE Transaction on Neural Networks on pulse coupled neural networks, pp.591-598, VOL. 10, NO. 3, May 1999.

**H. S. Ranganath** and G. Kuntimad, " Object detection using Pulse coupled neural networks", Special issue of IEEE Transaction on Neural Networks on pulse coupled neural networks, pp.615-620, VOL. 10, NO. 3, May 1999.

N. Clark, M. Banish, and **H. S. Ranganath**, "Smart adaptive optic systems using spatial light modulator", Special issue of IEEE Transaction on Neural Networks on pulse coupled neural networks, pp.599-603, VOL. 10, NO. 3, May 1999.

**H. S. Ranganath**, D. E. Kerstetter and S. R. F. Sims, "Self-Partitioning Neural Networks for Target Recognition", Neural Networks, Vol. 8, No. 9 , 1996, pp. 1475-1486.

**H. S. Ranganath** and Laure Chipman, "Fuzzy Relaxation Approach for Inexact Scene Matching," Image and Vision Computing, Volume 10, November 1992, pp. 631 - 640.

**H. S. Ranganath** and S. G. Shiva, "Correlation of Adjacent Pixels Method for Multiple Image Registration", IEEE Transaction on Computers, July 1985, pp. 674 - 677.

J. S. Boland and **H. S. Ranganath**, "Improved Method for Scene Matching of Dissimilar Imagery", IEEE Transaction on Automatic Control, June 1980, pp. 568 - 569

### ***Refereed Conference Papers***

Vineetha Bettaiah and **H. S. Ranganath**, "Two stage segmentation for efficient time series matching", *2nd International Conference on Research in Science, Engineering and Technology (ICRSET'2014)* - March 2014

Vineetha Bettaiah and **H. S. Ranganath**, "Hierarchical Piecewise Linear Approximation - A novel representation of time series data", *DBKDB 2014 - The 6th International Conference on Advances in Database, Knowledge, and Data Application* - April 2014

Vineetha Bettaiah and **H. S. Ranganath**, “An effective Subsequence-to-Subsequence time series matching approach”, IEEE 2014 Science and Information Conference (SAI) - August 2014

Raya, Bettaiah, **Ranganath**, “Adaptive pulse coupled neural network parameters for image segmentation”, *Proc of ICAINN 2011 - International Conference on Artificial Intelligence and Neural Networks*, January 2011.

Shivapuja, Bettaiah, Raya, **Ranganath**, “Rotation independent hierarchical representation for open and closed curves”, *Proc. of ATAI 2010 - International Conference on Advance Topics in Artificial Intelligence*, November 2010.

**Ranganath**, Bhatnagar, “Two-layer recurrent pulse coupled neural network for image segmentation”, *Proc. of ATAI 2010 - International Conference on Advance Topics in Artificial Intelligence*, November 2010.

Raya, Bettaiah, **Ranganath**, “Adaptive pulse coupled neural network parameters for image segmentation”, *Proc of ICAINN 2011 - International Conference on Artificial Intelligence and Neural Networks*, January 2011.

Soo Kim, Heggere **Ranganath**, “Efficient algorithms for the extraction of geometric features in edge images”, The 2010 International Conference on Image Processing, Computer Vision, & Pattern Recognition; Las Vegas, Nevada, July 2010.

**H. S. Ranganath**, M. Banish, R. Clark, P. Richards and G. Germany, “ Three applications of pulse coupled neural network”, International conference of Neural Networks and Artificial Intelligence, Stockholm, Sweden, June 1998, SPIE Vol. 3728, pp. 375-381.

T.H. Hinke, J. Rushing, **H. Ranganath** and S. Graves, “Target independent mining for scientific data”, Proceedings, The Third International Conference on Knowledge Discovery & Data Mining, Newport Beach, California, August, 1997.

T.H. Hinke, J. Rushing, S. Kansal, **H. Ranganath** and S. Graves, “For Scientific Data Discovery: Why can not the archive be more like the web ”, Proceedings, Ninth International Conference on Scientific Database Management, Evergreen State College, Olympia, Washington, August, 1997(pp. 96-99).

**H. S. Ranganath**, G. Kuntimad and J.L.Johnson, " Pulse coupled neural networks or image processing", Proc. 1995 IEEE SOUTHEASTCON, Raleigh, NC., March 95, pp.37-43.

**H. S. Ranganath** and D. Kerstetter, " Self partitioning neural networks for target recognition", Proc. 1995 SOUTHEASTCON

**H. S. Ranganath** and G. Kuntimad, " Image segmentation using pulse coupled neural networks", Proc. IEEE International Conference on Neural Networks, Orlando, FL., June 28 - July 2, 1994, vol.2, pp.1285-1290.

**H. S. Ranganath** and David Nabors, "Petri\_net Based Line Extractor for Binary Images," Proceedings IEEE SOUTHEASTCON 1992, pp. 404 - 409.

Laure Chipman and **H. S. Ranganath**, "A Fuzzy Relaxation Algorithm for Matching Imperfectly Segmented Images to Models," Proceedings IEEE SOUTHEASTCON 1992, pp. 128 - 136..

**H. S. Ranganath** and S. G. Shiva, "A New Method for Multiple Image Registration," National Conference on Integrated Circuits, Systems, and Signal Processing, Hyderabad, India, December 1984.

J.S. Boland, **H. S. Ranganath**, W.W. Malcolm, and D.V. Satish Chandra, "Multiple Image Registration Using Features Based on Adjacent Pixel Differences," IEEE Conference on Pattern Recognition and Image Processing, Las Vegas, Nevada, June 1982.

J. S. Boland, **H. S. Ranganath** and W. W. Malcolm, "Computational Efficiency of Multiple Image Registration Algorithms," SPIE National Conference, San Diego, California, August 1980.

J. S. Boland, **H. S. Ranganath** and W. W. Malcolm, "A Pattern Recognition Technique for Scene Matching of Dissimilar Imagery," 18th IEEE Conference on Decision and Control, Fort Lauderdale, Florida, December 1979, pp. 806 - 811.

*Conference Papers (abstract or summary is reviewed for acceptance)*

Sharif Bhuiyan, Reza Adhami, **Heggere Ranganath**, Jesmin Khan, "Aurora Image Denoising with a modified Bidimensional Empirical Mode Decomposition Method," To appear in the Proceedings of the IEEE Southeastcon 2008.

Banish, **Ranganath**, Christian Valdivia and Datz, "Neural network and geometric pattern matching algorithm for fully automated interpretation of lung scans", 44 th annual meeting of the Society of Nuclear Medicine, San Antonio, June 1997.

Valdivia, Banish, **Ranganath**, Christian and Datz, "Computer program developed for clinical use diagnoses pulmonary embolism and minimizes intermediate classification ", 44 th annual meeting of the Society of Nuclear Medicine, San Antonio, June 1997.

T.H. Hinke, J. Rushing, S. Kansal, S. Graves, **H. Ranganath** and E. Criswell, "Eureka Phenomena Discovery and Phenomena Discovery system", Proceedings American Meteorological Society 13 th International Conference on Interactive Information and Processing Systems for Meteorology, Oceanography and Hydrology, Feb. 2-7, 1997(pp.277-280).

P. G. Richards and **H. S. Ranganath**, "Automated Identification of Morphological Signatures in Global Auroral Images", presented at the Fall meeting of the American Geophysical Union, San Francisco, Dec. 1997, Trans. Amer. Geophys. Union(EOS), 78, 626, Nov. 18, 1997.

**H. S. Ranganath**, G. Kuntimad, "Iterative segmentation using pulse coupled neural networks", Proc. of the 1996 SPIE conference, pp.543-554, Orlando, FL.

**H. S. Ranganath** and Hung, "Knowledge Based Image Segmentation System," Sixth LASTED Conference on Expert Systems and Neural Networks, August 15 - 17, 1990, Honolulu, Hawaii.

Laure Chipman and **H. S. Ranganth**, "A Knowledge-Based Machine Vision System for Space Station Automation," Proceedings of the 1989 Conference on Computer Vision, Hampton, Virginia, May 1989.

R. Greene and **H. S. Ranganath**, "Integrating Scene Knowledge into the Recognition Process," Proceedings of the 1988 Conference on Pattern Recognition for Advanced Missile Systems, Huntsville, Alabama, November 1988.

R. Greene and **H. S. Ranganath**, "Knowledge Representation in Expert Vision Systems," The 1st International Conference on Industrial and Engineering Applications of Artificial Intelligence, Tullahoma, Tennessee, June 1988, pp. 689 - 696.

A. Loda and **H. S. Ranganath**, "A Hardware Implementation of Relaxation Algorithm for Image Segmentation," Proceedings of the Fourth Conference on Artificial Intelligence, Huntsville, Alabama, November 1986.

R. Greene and **H. S. Ranganath**, "Knowledge Representation for Expert Signal Interpretation," Software for Strategic Systems Conference Proceedings, Huntsville, Alabama, October 1988, pp. 173 - 182.

**H. S. Ranganath**, McInvale, and Sage, "Automatic Object Recognition," Conference on Artificial Intelligence for Space Applications, Huntsville, Alabama, November 1986, pp. 157 - 166.

**H. S. Ranganath**, "Extraction of Optimal Window for Binary Image Registration," Conference of Intelligent Systems and Machines, Rochester, Michigan, April 1986, pp. 54 - 57.

McIngvale, **Ranganath** and Speigle, "Object Cueing System for Infrared Images," Proceedings of the 1987 Conference on Infrared Image Processing and Enhancement, Orlando, Florida, May 1987.

**H. S. Ranganath**, "Applications of Image Processing," Technical and Business Exhibition Symposium, Huntsville, Alabama, April 1985.

**H. S. Ranganath** and R. Greene, "Moving Histograms for Object Detections," Proceedings of the IEEE Regional 3 Conference, April 1984, Louisville, Kentucky, pp. 456 - 459.

J.S. Boland, **H. S. Ranganath**, W.W. Malcolm and D.V. Satish Chandra, "Feature Matching Multiple Image Registration using Correlation of Adjacent Pixels," Proceedings of IEEE Regional 3 Conference, April 1982, pp. 537 - 540.

J.S. Boland , **H. S. Ranganath** and W.W. Malcolm, "Comparison of Thresholding Techniques for TV-to-IR Image Registration," Proceedings of IEEE Regional 3 Conference, Huntsville, Alabama, April 1981, pp. 474 - 477.

**H. S. Ranganath**, "Feature Matching of Algorithms for Multiple Image Registration," Alabama Academy of Science Meeting, Auburn, Alabama, April 1980.

J.S. Boland , **H. S. Ranganath** and W.W. Malcolm, "Feature Extraction Technique for the Fast Digital Image Registration," Proceedings of the 1980 IEEE Regional 3 Conference, Nashville, Tennessee, April 1980, pp. 225 - 228.

J.S. Boland , **H. S. Ranganath** and W.W. Malcolm, "Improved Method for Correlation of TV Sensor Images," Proceedings of Workshop on Imaging Trackers and Autonomous Acquisition Applications for Missile Guidance, Redstone Arsenal. Alabama. November 1979, pp. 296 - 309.

### ***Book Chapters***

J. Johnson, **H. Ranganath**, J. Caulfield and K. Kuntimad. "Pulse Coupled Neural Networks", *Neural Networks and Pattern Recognition* edited by O.Omidvar and J. Dayhoff, pp1-56, Academic Press, San Deigo CA(1998).