

**Wendy L. Martinez (Poston), Ph.D.**

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**PROFESSIONAL EXPERIENCE**

*Program Officer, Information Integration Program, Office of Naval Research (1997 to present):* I hold the position of Science and Technology Program Officer in the Mathematics, Computers, and Information Research Division. My mission is to provide naval science and technology products, options, and opportunities for the Navy and Marine Corps of the future by increasing knowledge and understanding in mathematics and statistics directly related to long-term Department of Defense needs; setting strategic research goals and initiating projects that achieve them; and directing research efforts in science and technology that advance the state-of-the-art and transition to the warfighter. These efforts often entail radically new concepts, multidisciplinary research teams, and feasibility demonstrations. Responsibilities/accomplishments:

- I manage a vertically integrated research and development program comprising government, academic, and industry researchers. This includes science and technology efforts at the basic research, applied research, and advanced technology development levels. My portfolio consists of approximately 60 projects with an annual budget of 25M to 30M.
- I manage research in statistical inference, pattern recognition and classification, data mining, probability theory, Bayesian networks, simulation methods for inferential statistics, decision-making under uncertainty, scientific and statistical visualization, network intrusion detection, and automated information integration.
- As a Program Manager for the applied research Command and Control and Combat Systems program, I am responsible for writing the annual solicitation, obtaining an outside review panel, evaluating proposals, providing feedback to offerors, making funding decisions, handling issues with the awards, and holding program reviews.
- I am a project monitor for the KDD (Knowledge Discovery and Dissemination) program in the intelligence community (April 2006 to the present). This partnership led to jointly funding two projects with the KDD program.
- I am a member of the international TTCP (The Technical Cooperation Program) C3I Group, Data Fusion Panel, where I work with representatives from the US (Army, Navy, and Air Force), United Kingdom, Australia, and Canada. The goal is to foster international collaborative research efforts in information fusion.
- I prepare and deliver oral presentations to the public and government on research issues, technical accomplishments, the state of the program, and future research directions. These also include invited presentations at conferences and universities, where I describe DoD funding opportunities.
- In my program, I support statistical education for minorities and women. For example, a Doctoral program in computational statistics was created at the University of Puerto Rico because of my ONR program support.
- I support and mentor young researchers in statistics through the Institute of Mathematical Statistics New Researchers Conference. This involves continued financial support for the conference, as well as presentations at the conference to help new researchers understand how to apply for federal funding.

*Adjunct Professor, Strayer University (1995 – 2006); George Mason University (1995 – 1997):* I taught graduate and undergraduate courses in mathematics, statistics, computational sciences, and databases.

- Courses taught at Strayer University: Quantitative Methods (graduate level), Descriptive Statistics, Algebra, Basic Mathematics, History & Methods of Science, Logic, and Databases
- Courses taught at George Mason University: Scientific Computing, Spatial Statistics, Applied Statistics, Scientific and Statistical Visualization, Scientific and Statistical Databases, Wavelets (all were at the graduate level)

Deputy Program Manager In-House Laboratory Independent Research (ILIR) Program, Naval Surface Warfare Center, Dahlgren, Virginia, 2000 to 2002: I held the position of Deputy Program Manager for the Center's basic research program. Duties were to:

- Plan, evaluate, and assess the research program in accordance with strategic goals of the Center, the Navy, and the nation.
- Expand the scope and diversity of the program.
- Promote more efforts in statistics, mathematics, and information science.
- Prepare annual written report to the Office of Naval Research on the state of the ILIR program.
- Develop, maintain, and participate in the ILIR process: call for proposals, evaluation and selection of proposals for funding, and annual progress reviews.

Scientist, Naval Surface Warfare Center, Dahlgren, Virginia, 1991 to 2002: I held the position of Scientist for Algorithm Development. Duties were to:

- Develop, analyze, and evaluate algorithms for modeling and simulation of sensor and Navy/USMC systems.
- Translate system attributes and physical characteristics into computer simulations.
- Perform basic research in the theory of probability density estimation, signal processing for automatic target recognition, image texture analysis for non-destructive testing, visualization of massive high-dimensional data sets, statistical pattern recognition, dimensionality reduction, parallel programming, and Monte Carlo methods for inferential statistics.

## **EDUCATION**

Ph.D. Computational Sciences and Informatics – Computational Statistics, George Mason University, 1995

M.S. Aerospace Engineering, George Washington University, NASA Langley Research Center, 1991

B.S. Physics and Mathematics (double major), Cameron University, 1989

## **CERTIFICATION**

SECRET Clearance

DAWIA (Defense Acquisition Workforce Improvement Act) – Level III, S&T Management

## **DISSERTATION/THESIS**

*Optimal Subset Selection Methods*, Ph.D. Dissertation, George Mason University, 1995

*Optimal Sensor Locations for On-Orbit Modal Identification of Large Space Structures*, Master's Thesis, George Washington University, 1991

## **BOOKS**

*Computational Statistics Handbook with MATLAB*, 2<sup>nd</sup> Edition, W. L. Martinez and A. R. Martinez, CRC Press, 2007

*Exploratory Data Analysis with MATLAB*, W. L. Martinez and A. R. Martinez, CRC Press, 2004

*Data Viz II*, Special Issue of *Computational Statistics and Data Analysis*, Wegman, Solka, and Martinez, 43 (4), 2003

*Computational Statistics Handbook with MATLAB*, W. L. Martinez and A. R. Martinez, CRC Press, 2002

## **SOFTWARE – MATLAB TOOLBOXES (written and freely distributed)**

Computational Statistics Toolbox, 2002/2007  
Exploratory Data Analysis GUI Toolbox, 2006  
Exploratory Data Analysis Toolbox, 2004  
Model-Based Clustering Toolbox, 2003

## **PATENTS**

U.S. Patent No. 5,859,919 Method and system for measuring surface roughness using fractal dimension values (1999)  
U.S. Patent No. 5,384,895 Self-organizing neural network for classifying pattern signatures using ‘a posterior’ conditional class probability (1995)  
U.S. Patent No. 5,351,311 Neural network for detection and correction of local boundary misalignment between images (1994)  
U.S. Patent No. 5,365,472 Non-linear resistive grid kernel estimator useful in single feature, two-class pattern classification (1994)

## **AWARDS**

Elected member of the International Statistical Institute, 2007  
Elected Fellow of the American Statistical Association, 2006  
Special Act Award, ONR, 1999  
NSWCDD Independent Research Excellence Award, 1995  
GMU Center for Computational Statistics Outstanding Ph.D. Dissertation in Statistical Science, 1995  
NSWCDD Fellowship Award, 1993 – 1994  
NASA – JIAFS Fellowship Award, 1989 – 1991

## **PROFESSIONAL ACTIVITIES**

Joint Statistical Meetings Program Chair 2009  
Elected Chair, ASA Section on Statistics in Defense and National Security, 2009  
Coordinating Editor for the journal *Statistics Surveys*, 2006 – 2008  
Chair, ASA Committee on Outreach Education, 2005 – 2010  
JSM Program Chair 2006, ASA Section on Statistics in Defense and National Security  
Track Chair, Conf on Quantitative Methods & Statistical Applications in Defense and National Security, 2006  
Member of Army Conference on Applied Statistics Executive Board, 2000 and ongoing  
Washington Statistical Society, Statistics and National Security program Co-Chair, 2004 and ongoing  
JSM Program Chair 2005, ASA Section on Statistics in Defense and National Security  
ENAR Program Chair 2005, Section on Statistics in Defense and National Security  
Member of ASA, Interface, IASC, and INFORMS  
Member of Steering Committee NSF Workshop on Density Estimation and Bump Hunting, 1995  
Attend meetings of NAS Committee on Applied and Theoretical Statistics (CATS), 1999 and ongoing  
Session Organizer and Chair for Interface and JSM meetings  
Referee papers for CSDA, JCGS, JSPI, *Journal of Nonparametrics*  
Member of the Historically Black Colleges and Universities/Minority Institutions Council – ONR

## PUBLICATIONS

### BOOK CHAPTERS

“Modeling and Simulation for Defense and National Security”, Martinez, in *Statistical Methods for Counter-Terrorism: Game Theory, Modeling, Syndromic Surveillance, and Biometric Authentication*, eds. David Olwell, Alyson Gabbard Wilson, and Gregory Wilson, Springer, 2006.

“Statistical software, software and astronomy (with discussion),” Wegman, Carr, King, Miller, Poston, Solka, and Wallin, in *Statistical Challenges in Modern Astronomy II*, eds. Babu, G. J. and Feigelson, E. D., New York: Springer-Verlag, 185-206, 1997.

“Moments and wavelets in signal estimation,” Wegman, Hung Le, Poston, and Solka, in *Statistics of Quality*, eds. Ghosh, Schucany, and Smith, Marcel Dekker, Inc., 253 – 274, 1996.

“Wavelets and nonparametric function estimation,” Wegman, Poston, and Solka, in *Research Developments in Statistics and Probability*, eds. Brunner and Denker, VSP International Science Publishers, 257 - 274. 1996.

“Maximizing the Fisher information matrix in discrete-time systems,” Poston, Priebe and Holland, in *Digital Design and Control Systems (Techniques and Their Applications)*, ed. C. Leondes, Academic Press, New York, 131 – 155, 1995.

### JOURNAL ARTICLES

“A conversation with Dorothy Gilford,” E. Wegman and W. Martinez, *Statistical Science*, 22 (2), p. 291 – 300, 2007

“Is citation normalization realistic?” Kostoff and Martinez, *Journal of Information Science*, 31 (1), p. 57 – 61, 2005

“An alternative criterion useful for finding E-optimal designs,” Martinez and Wegman, *Statistics and Probability Letters*, 47, 325 – 328, 2000

“Local dimensionality reduction using Normal Mixtures,” Marchette and Poston, *Computational Statistics*, 14, 469 – 489, 1999

“Explorations of the space of orthogonal transformations for using space-filling curves,” Solka, Wegman, Reid, and Poston, *Computing Science and Statistics*, 30, 494 – 498, 1998

“A parallel algorithm for subset selection,” Poston, Wegman, and Solka, *Journal of Statistical Computation and Simulation*, 60, 1 – 17, 1998

“D-optimal design methods for robust estimation of multivariate location and scatter,” Poston, Wegman, and Solka, *Journal of Statistical Planning and Inference*, 73, 205 – 214, 1998

“Mixture structure analysis using the Akaike information criterion and the bootstrap,” Solka, Wegman, Priebe, Poston, and Rogers, *Statistics and Computing*, 8, 177 – 188, 1998

“Recursive dimensionality reduction using Fisher’s linear discriminant,” Poston and Marchette, *Pattern Recognition*, 3, 881 – 888, 1997

“Ultrasonic imaging of cast ductile iron projectiles,” Holland, Poston, and Wegman, *Computing Science and Statistics*, 29, 292 – 298, 1997

“Application of Statistical Visualization Techniques to Image Classification,” Solka, Rogers, and Poston, *Computing Science and Statistics*, 29, 299 – 305, 1997

“Advanced processors - from concept to demonstration,” Holland, Stiegler, Poston and Steadman, *NSWCDD Tech Digest*, 78 – 87, 1996

“A deterministic method for robust estimation of multivariate location and shape,” Poston, Wegman, Priebe, and Solka, *Journal of Computational and Graphical Statistics*, 6(3), 300-313, 1996

“A new iterative adaptive mixtures type estimator,” Solka, Poston, Wegman, and Wallet, *Computing Science and Statistics*, 28, 573-578, 1996

“Using fractal geometry to determine the roughness of cast ductile iron,” Holland, Poston, and Solka, *Computing Science and Statistics*, vol. 27, p. 309, 1995

“Visualization of adaptive mixtures estimates of DNA flow cytometry,” Solka, Poston, Wegman, and Marchette, *Computing Science and Statistics*, vol. 27, 447 – 455, 1995

“A visualization technique for studying the iterative estimation of mixture densities,” Solka, Poston, and Wegman, *Journal of Computational and Graphical Statistics*, vol. 4, no. 3, 180 – 198, 1995

“Finding the minimum volume ellipsoid,” Poston and Priebe, *Computing Science and Statistics*, 26, 351 - 355, 1994

“A qualitative analysis of the resistive grid kernel estimator,” Poston, Rogers, Priebe, and Solka, *Pattern Recognition Letters*, vol. 15, p. 219, 1994

“The application of fractal analysis to mammographic tissue classification,” Priebe, Solka, Lorey, Rogers, Poston, Kallergi, Qian, and Clarke, *Cancer Letters*, Vol. 77, p. 183, 1994

“Maximum likelihood density estimation with term creation and annihilation,” Solka, Priebe, Rogers, Poston, and Lorey, *Computing Science and Statistics*, vol. 26, 222 - 225, 1994

“Maximizing the determinant of the information matrix with the effective independence distribution method,” Poston and Tolson, *AIAA Journal of Guidance, Control, and Dynamics*, Nov-Dec, p. 1513, 1992

## **BOOK REVIEWS**

“Review of *Introduction to MATLAB® with Numerical Preliminaries*,” *Statistical Methods in Medical Research*, 14 (5), October 2005

“Review of *Random Graphs for Statistical Pattern Recognition*,” *Statistical Methods in Medical Research*, 14 (5), 532-533, 2005

“Review of *Discrete Multivariate Distributions*,” *Technometrics*, 40, 160 – 161, 1998

“Review of *Advanced Calculus with Applications in Statistics*,” *J. of Applied Statistics*, 24, 247 – 248, 1997

## **INVITED PRESENTATIONS/SEMINARS**

“Funding opportunities in the DoD,” INFORMS 2007, Seattle

“Funding opportunities in data mining,” Data Mining Workshop, INFORMS 2006, Pittsburgh

“Threat detection using biometrics,” 34<sup>th</sup> *Annual Mathematics & Statistics Conference, Understanding Biological and Medical Systems using Statistics*, Miami University, September, 2006

“Andrews’ image,” CDC, May 2006

“Funding opportunities in the DoD,” International Chinese Statistical Association (ICSA), June 2005

“Research directions in adaptive mixtures and model-based clustering,” Seminar, NIST, May, 2005

“SensorNet”, Invited Panel, Emerging Technology Summit III, Open Geospatial Consortium, April, 2005

“Research directions in adaptive mixtures and model-based clustering,” Seminar, George Mason University, April, 2005

“Model-based Clustering – An ONR-developed Method for Grouping Scientific Data,” Office of Naval Research Seminar, 2005

“Weighting the Text Proximity Matrix,” George Mason University, 2004

“DoD Funding Opportunities,” invited panel, INFORMS 2004

“Research Directions in Adaptive Mixtures and Model-Based Clustering,” University of Washington, 2004

“Funding Opportunities at ONR,” New Researchers Conference, Toronto, Canada, 2004

“Funding Opportunities in the Department of Defense,” George Washington University, 2003

“An Introduction to Model-Based Clustering,” Naval Academy, Annapolis, MD, 2003

Discussant – 2003 Roger Herriot Award for Innovation in Federal Statistics – David L. Banks, recipient, 2003

“Optimal Subset Selection Methods & Introduction to Model-based Clustering,” George Mason University, 2003

“Model-based Clustering in MATLAB,” University of Washington, 2002

“Network Intrusion Detection,” Discussant, JSM 2002

“Funding Opportunities at ONR,” New Researchers Conference, Atlanta, GA, 2001

“Network Intrusion Detection,” Army Conference on Applied Statistics, 2000

“Funding Opportunities at ONR,” New Researchers Conference, Baltimore, MD, 1999

“Optimal Subset Selection Methods,” George Mason University, 1999

Panel Participant on Federal Funding, Joint Statistical Meetings, 1999

“Harmogram Analysis for 1-D and 2-D Signals,” George Mason University, 1997

“A deterministic method for robust estimation of multivariate location and shape,” George Mason University, 1996

“Visualizing Data,” Cameron University, 1996

### **CONFERENCE PAPERS**

“Model-based Clustering Toolbox for MATLAB,” Martinez, A. and Martinez, W, Interface 2005

“Alternative visualization of Andrews’ curves,” Martinez, W. and Martinez, A., Interface 2005

“Research directions in adaptive mixtures and model-based clustering,” Martinez and Solka, *Proceedings Army Conference on Applied Statistics*, 2004

- “A mixture-based approach to latent class discovery,” Solka and Martinez, *Proceedings of the Joint Statistical Meetings*, 2004
- “Classification and clustering using weighted text proximity matrices,” Martinez, W., Martinez, A., and Wegman, *Proceedings Interface 2004: Computational Biology and Bioinformatics, 36<sup>th</sup> Symposium on the Interface*, May, 2004
- “Using weights with a text proximity matrix,” Martinez, A., Wegman, and W. Martinez, *COMPSTAT 2004*, (invited and refereed), 2004
- “Visualizing the output of model-based clustering,” Martinez, W. and A. Martinez, *COMPSTAT 2004*, (refereed), 2004
- “Model-based clustering with an adaptive mixtures smart start,” Solka and Martinez, *Proceedings Interface 2004: Computational Biology and Bioinformatics, 36<sup>th</sup> Symposium on the Interface*, May, 2004
- “ReClus – A tool to explore the output of clustering algorithms,” Martinez, A. and W. Martinez, *Joint Statistical Meetings, ASA Proceedings Statistical Computing Section*, 2003
- “A graphical user interface for the exploratory analysis of high-dimensional data using ISOMAP,” Martinez, W. and A. Martinez, *Joint Statistical Meetings, ASA Proceedings Statistical Computing Section*, 2003
- “Encoding of text to preserve ‘meaning’,” Martinez, and Wegman, (presented by W. Martinez), Army Conference on Applied Statistics, 2002
- “Visualization methods for cluster assessment in high dimensional spaces,” Solka, Marchette, Poston, and Wallet, *Proceedings of the Joint Conference on Information Sciences*, 1998
- “Image grand tour,” Wegman, Poston, and Solka, *Automatic Target Recognition VIII – Proceedings of SPIE*, 3371, 286 – 294, 1998
- “Parallel Coordinate Plot Analysis of Polarimetric NASA/JPL AIRSAR Imagery,” Solka, Rogers, Poston, and Wegman, *Automatic Target Recognition VII - Proceedings of SPIE*, Vol. 3069, pp. 175-184, 1997
- “Immersive methods for mine warfare,” Wegman, Solka, and Poston, MASEVR '95, Proceedings of the Second International Conference on the Military Applications of Synthetic Environments and Virtual Reality, 203 – 218, 1996
- “A new finite mixture parameter initialization procedure,” Poston, Wegman, and Solka, *Joint Statistical Meetings, ASA Proceedings Statistical Computing Section*, p. 79 – 84, 1996
- “Massive data sets in Navy problems,” Solka, Poston, Marchette, and Wegman, *Massive Data Sets: Proceedings of a Workshop*, National Academy Press, Washington, D. C., pp. 157 – 167, 1996
- “A new order independent adaptive mixtures type estimator,” Solka, Wegman, and Poston, *Joint Statistical Meetings, ASA Proceedings Statistical Computing Section*, p. 67 – 72, 1996
- “A system for determining the surface roughness of ductile iron castings,” Holland, Poston, and Schwartz, *Proceedings of the 43rd Defense Working Group on Nondestructive Testing*, p. 130, 1994
- “Choosing data sets that optimize the determinant of the Fisher information matrix,” Poston and Solka, *Proc. IEEE-IMS Workshop on Information Theory and Statistics*, p. 73, 1994
- “A parallel method to maximize the Fisher information matrix,” Poston and Solka, *ISUG (Intel Supercomputer User Group) '94*, June 1994, San Diego, CA., p. 133, 1994

“The detection of micro-calcifications in mammographic images using high dimensional features,” Solka, Poston, Priebe, Rogers, Lorey, Marchette, Woods, and Bowyer, *Proc of 1994 IEEE Seventh Symposium on Computer-based Medical Systems*, June 1994

“The application of Akaike information criterion based pruning to nonparametric density estimation,” Solka, Priebe, Rogers, Poston, and Marchette, *Proc. IEEE-IMS Workshop on Information Theory and Statistics*, p. 74, 1994

“A concurrent paradigm architecture for automatic target recognition,” Holland, Smith, Nichols, and Poston, *Intelligent Engineering Systems Through Artificial Neural Networks*, vol. 3, ed. Dagli, Burke, Fernandex, and Ghosh, ASME Press, p. 281, 1993

“A harmonic feature set for classification using an artificial neural network,” Poston, Holland, and Nichols, *Intelligent Engineering Systems Through Artificial Neural Networks*, vol. 3, ed. Dagli, Burke, Fernandex, and Ghosh, ASME Press, p. 287, 1993

“Kernel estimators and resistive neural networks,” Rogers, Poston, Priebe, and Solka, *NATO Advanced Study Inst: From Statistics to Neural Networks*, June 1993

“Enhanced harmogram analysis techniques for extraction of principal frequency components,” Holland, Poston, and Nichols, *Intl. Conf on DSP Appls & Tech*, Nov 1992

“A vector quantization network for the estimation of probability density functions,” Poston, Priebe, Rogers, and Solka, *Intelligent Engineering Systems Through Artificial Neural Networks*, vol. 2, ed. Dagli, Burke, and Shin, ASME Press, p. 109, 1992

“Estimating discontinuous probability densities using a resistive grid kernel estimator,” Rogers, Poston, Priebe, and Solka, *Intelligent Engineering Systems Through Artificial Neural Networks*, vol. 2, ed. Dagli, Burke, and Shin, ASME Press, p. 451, 1992

## **TECHNICAL REPORTS**

NSWCDD/TR-01/171, “Vertical Launch System (VLS) Underway Replenishment (UNREP) Analysis” by Thoms, Holland, and Martinez

NSWCDD/TR-96/44, “Expendable Acoustic Remote Sensor Development” by Epling, Freeman, Poston, et al.

NSWCDD/TR-92/241, "Resistive Grid Kernel Estimator (RGKE)" by Poston, Rogers, Priebe, and Solka

NSWCDD/TR-92/313, "Enhanced Harmogram Analysis Techniques for Extraction of Principal Frequency Components" by Poston, Holland and Nichols

NSWCDD/TR-92/317, "Advanced Processors for Weapons Sensor Fusion Review and Progress," by Holland, Nichols, Poston, and Tarr

NSWCDD/TR-92/627, "A Self-Organizing Vector Quantization Network for the Estimation of Probability Density Functions," by Rogers, Solka, Priebe, and Poston