

Linda A. Ness

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EDUCATION

- PhD (1975) in Mathematics – Harvard University. Thesis Title: “Curvature of Algebraic Curves”
Advisor D. Mumford
- MS (1987) in Computer Science - U. of Texas at Austin
- MS (1972) in Mathematics - Harvard University
- BA (1969) in Mathematics - St. Olaf College

MOST RECENT POSITIONS

- Part-time Research Scientist, DIMAC at Rutgers University and Founder, QEDelta, LLC
- Chief Research Scientist: Applied Research, Vencore Labs
- NOTE: From 1987 to October, 2015 Linda Ness was in Applied Research. The company name changed several times due to ownership changes. It is currently Vencore Labs doing business as Applied Communication Sciences. Formerly the company name was Telcordia (1999-2012) and prior to that Bellcore (1985-1998).

EXPERTISE

- Data Science Research
 - multiscale representation algorithms for data, including mathematical theory and application
 - representing and fusing high-dimensional data (including time series data)
 - characterizing normal structure in data and enabling detection of anomalies
 - predicting/extending functions and analysis methodologies exploiting these algorithms
 - automatic generation of features for machine learning
 - visualizing data
- Mathematics and Computer Science (including teaching mathematics and computer science)
- Supervising undergraduate and graduate Summer Students at Kean Univeristy, Vencore Labs and in the DIMACS REU
- Research Program Management
- Management of Technology Transition and Insertion into Operations Support Systems Processes and Products and Software Development Processes

EXPERIENCE

Chief Research Scientist

2008 – October, 2015

Initiated and led a 6 year on-going collaboration with Yale University Professors Peter Jones and Vladimir Rokhlin focused on theory-based algorithms for representing the geometry of data; supervised summer student to apply algorithms to wireless network data for unsupervised detection of anomalies

Co-Principal Investigator of two research projects focused on fast multi-scale algorithms for representing and analyzing high-dimensional data exploiting theoretical mathematical results. Both projects are in collaboration with Professors Peter Jones and Vladimir Rokhlin of Yale University:

- Applications to Network Dynamics of Positive Measures and Product Formalisms: Analysis, Synthesis, Visualization and Missing Data Approximation, AFOSR Complex Networks Program, Directorate: Mathematics, Information and Life Sciences (2010 – 2015)
- Fast Multiscale Algorithms for Information Representation and Fusion. Mathematics, Computers and Information Research Division, ONR (2011-2013)

IARPA Knowledge Discovery and Dissemination project: researching mutli-scale algorithms for inferring finer-grained relational theories (e.g. hierarchical block structures) from base relational data.

Program Manager, Strategic IR&D Program 2011 – 2013

- Facilitate proposal submissions and internal and external reviews; actively work with researchers leading the projects.

Program Manager, Internal Research and Development 1997 – 2008

- Led and managed Applied Research's IR&D Program with the Strategic Business to introduce innovative differentiators and new technologies into Telcordia's products and services

Director, Enterprise Integration Research Group 1993 – 1996

Member of Technical Staff, Executable Protocol Specification Environments 1987 – 1993

Professor of Mathematics 1975 - 1987

- Associate Professor, Mathematics – Carlton College – 1984-1987 (on leave 1986-87)
- Visiting Associate Professor, Mathematics – University of Pennsylvania – 1983-84
- Assistant Professor , Mathematics – University of Washington 1975- 1983

PROFESSIONAL ACTIVITIES AND HONORS:

- WiSDM workshop (Women in Science of Data and Mathematics Research Collaboration Workshop) at ICERM, funding approved for summer, July 2017, chair of organizing committee
- Workshop on "Mathematics in Data Science" at ICERM (the National Science Foundation's Institute for Computational and Experimental Research in Mathematics) at Brown University, July 2015.
 - Proposed the idea for the workshop to ICERM and chaired its organizing committee. One hundred and twenty people registered for the session – the highest number ever for an ICERM workshop. Jill Pipher, Director of ICERM and Professor of Mathematics at Brown University, reported that this event was "one of ICERM's most exciting and packed conferences ever." Experts from industry, academia, government labs and program offices attended.
- National Academies Panel on Information Science at the Army Research Laboratory (2014 - present)
- Advisory Board: Women and Mathematics Program at the Institute for Advanced Studies, 2015 - present
- Advisory Board: Association for Women in Mathematics, 2013 to present
- National Academies Panel on Digitization and Commerce (2012)
- DIMACS Executive Committee – 2012 – October, 2015
- MCC Fellowship – University of Texas Computer Science Department – 1986-87
- Radcliffe Bunting Institute Fellowship, 1980
- National Science Foundation Fellowship, 1969-1972

SELECTED PUBLICATIONS AND PRESENTATIONS:

- L. Ness. Dyadic Product Formula Representations of Confidence Measures and Decision Rules for Dyadic Data Sets, Data Science 2016 (Seventh ASE International Conference on Data Science), August 15-17, 2016 (accepted)

- D. Bassu, L. Ness, P. Jones, D. Shallcross. Product Formalisms for Measures on Spaces with Binary Tree Structures: Representation, Visualization, Inference and Decision (submitted to a journal, should be posted on the Math ArXiv soon) (long paper with 2 application appendices and one algorithms appendix)
- D. Bassu, L.Ness, D. Shallcross, B. Thompson. Discovering Functional Communities in Social Media, IEEE Conference on Data Mining (IEEE ICDM 2015), Workshop on Information Analysis and Data Mining Over Social Networks (DMSN), November, 2015. http://pidancer.com/research/Thompson_co-clustering_DMSN15.pdf
- D. Bassu, P. W. Jones, L. Ness, D. Shallcross. Product Formula Representations for Measures on Spaces with Binary Tree Structures: Representation, Visualization, Inference, Decision and Application, Mathematics in Data Science Workshop, July 28-30, 2015 [https://icerm.brown.edu/materials/Slides/tw-15-6/Product Formula Representations for Measures on Spaces with Binary Tree Structures-Representation, Visualization, Inference, Decision and Application %5D Linda Ness, Applied Communication Sciences.pdf](https://icerm.brown.edu/materials/Slides/tw-15-6/Product%20Formalisms%20for%20Measures%20on%20Spaces%20with%20Binary%20Tree%20Structures-Representation,%20Visualization,%20Inference,%20Decision%20and%20Application%5D%20Linda%20Ness,%20Applied%20Communication%20Sciences.pdf)
- D. Bassu, P. W. Jones, L. Ness, D. Shallcross. Product Formalisms for Measures, Multiplicative Noise, and Geometric Signal Representation, Mathematics in Data Science Workshop, July 28-30, 2015 [https://icerm.brown.edu/materials/Slides/tw-15-6/Multiscale Methods for Positive Data and Noise %5D Peter Jones, Yale University .pdf](https://icerm.brown.edu/materials/Slides/tw-15-6/Multiscale%20Methods%20for%20Positive%20Data%20and%20Noise%5D%20Peter%20Jones,%20Yale%20University.pdf)
- P. Bendich, E. Gasparovic, J. Harer, R. Izmailov, L. Ness. Multi-Scale Local Shape Analysis and Feature Selection in Machine Learning Applications”, 2015 International Joint Conference on Neural Networks and for publication in the conference proceedings published by IEEE. <http://arxiv.org/pdf/1410.3169.pdf>
- D. Bassu, R. Izmailov, A. McIntosh, L. Ness, D. Shallcross. “Application of Multi-Scale Singular Vector Decomposition to Vessel Classification in Overhead Satellite Imagery 7th Annual International Conference on Digital Image Processing, 2015.
- L.Ness (collaborators – D. Bassu, R. Izmailov, P.W.Jones, V. Rokhlin, D. Shallcross –“Multiscale Representation of High Dimensional Data”, ICERM workshop on Mathematics of Data Analysis in Cybersecurity, October 22-24, 2014. [http://icerm.brown.edu/materials/Abstracts/tw-14-8/Multiscale Representation of High Dimensional Data %5D Linda Ness, Applied Communication Sciences.pdf](http://icerm.brown.edu/materials/Abstracts/tw-14-8/Multiscale%20Representation%20of%20High%20Dimensional%20Data%5D%20Linda%20Ness,%20Applied%20Communication%20Sciences.pdf)
- D. Bassu, R. Coifman, P.W. Jones, L. Ness, V. Rokhlin, “Eigenvectors, Heat Kernels and Low Dimensional Representations of Data Sets”, ICERM workshop on Eigenvectors in graph theory and related problems in numerical linear algebra”, May 5-9, 2014: [http://icerm.brown.edu/materials/Slides/sp-s14-w4/Eigenvectors, Heat Kernels, and Low Dimen](http://icerm.brown.edu/materials/Slides/sp-s14-w4/Eigenvectors,%20Heat%20Kernels,%20and%20Low%20Dimen)
- D.Bassu, R.Izmailov, A.McIntosh, L.Ness, D.Shallcross, “Centralized Multi-Scale Singular Vector Decomposition for Feature Construction in LIDAR Image Classification Problems”. IEEE Applied Imagery and Pattern Recognition Workshop (AIPR), 2012.
- [BaJo1] D. Bassu, P. Jones, L. Ness, V. Rokhlin, “Fast Multiscale Algorithms for Representation and Analysis of Data, FERC Technical Conference on Increasing Real-Time and Day-Ahead Market Efficiency through Improved Software”, June 30, 2011, <http://www.ferc.gov/EventCalendar/Files/20110630080646-Jun30-SesB2-Ness-Telcordia.pdf>
- D. Bassu, L.Ness, P. Jones, V. Rokhlin. Product Formulas for Positive Functions and Applications to Network Data. DIMACS Workshop on Statistical Issues in Analyzing Information from Diverse Sources. May 6-7, 2010. <http://ccicada.rutgers.edu/Workshops/DiverseSources/Slides/Jones.pdf>.

- D. Bassu, L.Ness, P. Jones, V. Rokhlin. Some New Methodologies for Numerical Analysis of Network Data. DIMACS Workshop on Algorithmic Decision Theory for the Smart Grid. October 25-27, 2010.
<http://dimacs.rutgers.edu/Workshops/SmartGrid/Slides/slides.html>
- E.M. Clarke, O. Grumberg, H. Hiraishi, S. Jha, D.E. Long, K.L. McMillan, L.A. Ness, "Verification of the Futurebus+ Cache Coherence Protocol", Proceedings of the 1993 Conference on Hardware Description Languages, Also published in Journal of Formal Systems Design.
- L.A. Ness, "A Truly Concurrent Executable Temporal Logic Language for Protocols", IEEE Transactions on Software Engineering, Vol. 19, No. 4, April, 1993, pages 410 - 423.
- M. Ansari, L. Ness, M. Rusinkiewicz, A. Sheth, "Using Flexible Transactions to Support Multi-system Telecommunication Applications", Proc. of the 18th VLDB Conference, August 1992.
- L. Ness, "A stratification of the null cone via the moment map" American Journal of Mathematics 106(6): 1281-1329. (Appendix by D. Mumford).
- L. A. Ness, G. Kempf, "Tensor Products of Fundamental Representations", Canadian Journal of Mathematics, Vol. XL, No. 3, pages 633-648, 1989.
- L. A. Ness, "Mumford's Numerical Function and its Applications to Stable Projective Hypersurfaces", Proceedings of the Copenhagen Summer Meeting in Algebraic Geometry, Springer Lecture Notes, Vol 732, pages 417-454, 1979.
- L. A. Ness, G. Kempf, "Lengths of Vectors in Representation Spaces", Proceedings of the Copenhagen Summer Meeting in Algebraic Geometry, 1979, Springer Lecture Notes, No 732, pages 233-244.