

Benjamin Kedem CV

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Biographical Sketch

Benjamin Kedem

Department of Mathematics & Institute for Systems Research
University of Maryland, College Park, MD 20742

Benjamin Kedem is a Professor and Director of the STAT Program, Department of Mathematics, University of Maryland, College Park. He received a PhD in statistics from Carnegie-Mellon University in 1973. Broadly speaking, his research deals with time series analysis, generalized linear models, semiparametric statistical inference, and data fusion. At present he is working on applications of augmented reality in the estimation of very small tail probabilities.

Honors and Awards

1986, HOC selected as an accomplishment, AFOSR.
1988, IEEE Baker Award.
1997, NASA/Goddard Award in connection with TRMM.
1999, ASA Fellow.
2006, IBM Faculty Award.
2013, Fulbright Specialist.

Books, Monographs, Lecture Notes, etc.

1. *Binary Time Series*, Lecture notes, Dekker, 1980.
2. *Time Series Analysis by Higher Order Crossings*, IEEE Press, 1994.
3. *Regression Models for Time Series Analysis*, with K. Fokianos, Wiley, 2002.
4. Guest Editor, Semiparametric Methods, *Journal of Statistical Theory and Practice*, Volume 2, No. 3, September 2008.
5. *Statistical Data Fusion*, with V. De Oliveira and M. Sverchkov, World Sci. 2017.

Selected Time Series Publications

1. Estimating the Kernels of Nonlinear Orthogonal Polynomial Functionals, *Annals of Statistics*, 1974, Vol. 2, No. 2, 353-358.
2. Estimating the Lags of Lag Processes, *Journal of the American Statistical Association*, 1975, Vol. 70, No. 3, 603-605.
3. Estimation of the Parameters in Stationary Autoregressive Processes After Hard Limiting, *Journal of the American Statistical Association*, 1980, Vol. 75, 146-153.
4. On Nearest Neighbor Degeneracies of Indistinguishable Particles, *J. Mathematical Physics*, 1981, Vol. 22, 456-461.
5. On Goodness of Fit of Time Series Models: An Application of Higher Order Crossings (with E. Slud), *Biometrika*, 1981, Vol. 68, 551-555.
6. Time Series Discrimination by Higher Order Crossings (with E. Slud), 1982, *Annals of Statistics*, Vol. 10, 786-794.
7. A Two Dimensional Higher Order Crossings Theorem, *IEEE Tr. Information Theory*, 1983, Vol. IT-29, 159-161.
8. On the Sinusoidal Limit of Stationary Time Series, *Annals of Statistics*, 1984, Vol. 12, 665-674.
9. Spectral Analysis and Discrimination by Zero-Crossings. *Proceedings of the IEEE*, 1986, Vol. 74, No. 11, 1475-1493.
10. Order Crossings in Time Series Model Identification, *Technometrics*, 1987, Vol. 19, 193-204.
11. Higher Order crossings Spectral Analysis of an Almost Periodic Random Sequence in Noise (with S. He), *IEEE Tr. Information Theory*, 1989, Vol. 35, 360-370.
12. Convergence of the zero-crossing rate of autoregressive processes and its link to unit roots (with S. He). *Jour. of Time Series Analysis*, 1990, Vol. 11, 201-213.
13. Monotone gain, first-order autocorrelation, and expected zero-crossing rate (with T. Li), *Annals of Statistics*, 1991, Vol. 19, 1672-1676.
14. Contraction mappings in mixed spectrum estimation, in *New Directions in Time Series Analysis*, D. Brillinger et al. eds., Springer-Verlag, NY, IMA, Vol. 45, pp. 169-191, 1992.
15. Fixed points in mixed spectrum analysis, in *Probabilistic and Stochastic Methods in Analysis*, With Applications (with S. Lopez), J. S. Byrnes et al. (eds.), Kluwer, Mass., 1992, pp. 573-591.

16. Asymptotic analysis of a multiple frequency estimation method (with T. Li), *Jour. Multivariate Analysis*, 1993, Vol. 46, 214-236.
17. On autocorrelation estimation in mixed spectrum Gaussian processes (with E. Slud), *Stochastic Processes and Their Applications*, 1994, Vol.49, 227-244.
18. Practical aspects of a fast algorithm for frequency detection (with S. Yakowitz), *IEEE Tr. Communications*, 1994, Vol. 42, 2760-2767.
19. An iterative filtering algorithm for non-Fourier frequency estimation (with J. Troendle), *Jour. of Time Series Analysis*, 1994, Vol. 15, 45-63.
20. Partial likelihood analysis of logistic regression and autoregression (with E. Slud), *Statistica Sinica*, 1994, Vol. 4, 1994, 89-106.
21. Iterative filtering for multiple frequency estimation (with T. Li), *IEEE Tr. Signal Processing*, 1994, Vol. 42, 1120-1132.
22. On autocovariance estimation for mixed spectrum stationary time series, (with C. Houdré), *Statistics and Probability Letters*, 1995, Vol. 24, 1-8.
23. Bayesian prediction of transformed Gaussian random fields (with V. De Oliveira and D. Short), *Journal of the American Statistical Association*, 1997, Vol. 92, No. 440, 1422-1433.
24. Zero-crossing rates of mixtures and products of Gaussian processes (with J. Barnett). *IEEE Tr. Information Theory*, 1998, Vol. 44, 1672-1677.
25. Partial likelihood analysis of categorical time series models (with K. Fokianos), *Jour. Multivariate Analysis*, 1998, Vol. 67, 277-296.
26. Generation of “similar” images From a given discrete image (with B. Kozintsev), *Jour. Computational and Graphical Statistics*, 2000, Vol. 9, No. 2, 286-302.
27. Bayesian transformed Gaussian random field: A review (Invited paper; with V. De Oliveira and K. Fokianos). *Japanese Jour. of Appl. Statistics*, 2002, Vol. 31, 175-178.
28. Regression theory for categorical time series (with K. Fokianos). *Statistical Science*, 2003, Vol. 18, 357-376 (2 col. per page).
29. Partial likelihood inference for time series following generalized linear models (with K. Fokianos). *Jour. of Time Series Analysis*, 2004, Vol. 25, 173-197.
30. Modeling long memory eye gaze data (with R. Sur, L. Noy, T. Flash). *2nd European Workshop on Visual Information Processing (EUVIP)*, Paris, 5-6 July 2010, pp. 193-197.

31. Coherence Structure and its Application in Mortality Forecasting (with D. Khan, M. Katzoff). *J. Statistical Theory and Practice*, 2014, 8, 578-590.
32. Coherence Consideration in Binary Time Series Analysis. Invited chapter for *Handbook of Discrete-valued Time Series*, R. Davis, S. Holan, R. Lund, and, N. Ravishanker eds., Chapman Hall/CRC, 2016, 311-323.

Selected Publications on Rainfall

1. On the lognormality of rain rate (with L. S. Chiu), *Proc. National Acad. Sci., USA*, 1987, Vol. 84, 901-905.
2. Are Rain Rate Processes Self-similar? (with L. S. Chiu), *Water Resources Research*, 1987, Vol. 23, 1816-1818. Reply to commentary: March 1989, Vol. 25, p. 580.
3. Estimation of mean rain rate: Application to Satellite observation (with L. S. Chiu, G. North), *Jour. Geophysical Research*, 1990, Vol. 95, 1965-1972.
4. On the threshold method for rainfall estimation: choosing an optimal threshold level (with H. Pavlopoulos), *Journal of the American Statistical Association*, 1991, Vol. 86, 626-633.
5. An analysis of the threshold method for measuring area average rainfall (with L. Chiu and Z. Karni). *Jour. Appl. Meteor.*, 1990, Vol. 29, January 1990, 3-20
6. Optimal thresholds for the estimation of area rain rate moments by the threshold method (with D. Short and K. Shimizu), *Jour. Appl. Meteor.*, Vol. 32, 1993, 182-192.
7. On a curious linear relationship between rainfall averages (invited paper with D. Short), *Resenhas IME-USP*, Vol. 1, 217-232, 1994.
8. Predicting precipitation levels (with K. Fokianos and D. Short), *Jour. Geophysical Research*, 1996, Vol. 101, 26473-26477.
9. Variability of space-time mean rain rate (with R. Pfeiffer and D. Short), *Jour. Appl. Meteor.*, 1997, Vol. 36, 443-451.

Selected Semiparametric and Data Fusion Publications

1. A semiparametric approach to the one way layout (with K. Fokianos, J. Qin, and D. Short). *Technometrics*, 2001, Vol. 43, 56-65.
2. Statistical comparison of algorithms (with D. Wolff and K. Fokianos). *IEEE Tr. on Instrumentation and Measurement*, 2004, Vol 53, 770-776.
3. Forecasting mortality rates via density ratio modeling (with G. Lu, R. Wei, D. Williams). *Canadian Jour. of Statistics*, 2008, 36, 193-206.

4. An approach to handle the problem of zero deaths in estimating mortality rates (with A. Voulgaraki A and R. Wei R), *Proceedings of the American Statistical Association, Section on Statistics in Epidemiology*, 1914-21, 2008.
5. On the Efficiency of a Semiparametric Approach to the One-Way Layout (with R. Gagnon, Y. Qi). *J. Statistical Theory and Practice*, 2008, 2, 385-406.
6. Two-Dimensional Semiparametric Density Ratio Modeling of Testicular Germ Cell Data (with E-Y Kim, A. Voulgaraki, B. Graubard). *Statistics in Medicine*, 2009, 28, 2147-2159.
7. Semiparametric Distribution Forecasting (with R. Gagnon). *Journal of Statistical Planning and Inference*, 2010, 140, 3734-3741.
8. Semiparametric Regression in Testicular Germ Cell Data (with A. Voulgaraki and B.I. Graubard). *The Annals of Applied Statistics*, 2012, 6, 1185-1208.
9. Estimation of Death Rates in U.S. States with Small Subpopulations (With A. Voulgaraki, R. Wei). *Statistics in Medicine*, 2015, Vol. 34, Issue 11, 1940-1952.
10. Interval Estimation of Small Tail Probabilities–Applications in Food Safety (with Pan, L., Wen, Z., and C.A. Cohelho). *Statistics in Medicine*, 2016, Vol. 35, Issue 18, 3229-3240.
11. Bayesian semiparametric density ratio modelling with applications to medical malpractice reform (with K. Dayaratna). *Statistical Modelling*, 2016, Vol. 16, 261-278.
12. Bayesian analysis of a density ratio model (with V. De Oliveira). *Canadian Jour. of Statistics*, 2017, 45, 274-289.
13. Estimation of small tail probabilities by repeated fusion (with L. Pan, P.J. Smith, C. Wang), *Mathematics and Statistics*, 2019, 7(5), 172-181.
14. Estimation of Radon Concentration in Pennsylvania Counties (with X. Zhang and S. Pyne). *Appl. Stoch. Models in Business and Industry*, 2020, DOI: 10.1002/asmb.2546
15. Model Selection in Radon Data Fusion (with X. Zhang and S. Pyne). *Statistics in Transition new series*, to appear.

Some Invited Talks

1. "Signal Analysis by Higher Order Crossings (HOC)," a 5-hr. presentation via satellite from coast to coast, January 21, 1988.
2. Int'l WMO/IAHS/ETH meeting, St. Moritz, Switzerland, "Linear relationships for rain rate estimation from space," Dec. 4-7, 1989.
3. Symposium on New Directions in Time Series Analysis, Institute of Mathematical Analysis and Applications, Univ. of Minnesota, "Contraction mappings in mixed spectrum analysis," July, 1990.
4. Invited lectures on higher order crossings, Tsinghua University, Beijing, China, 12.22.1990-1.10.1991.
5. NATO ASI, Il Ciocco, Italy, "Fixed points in mixed spectrum estimation," July 14-27, 1991.
6. 4th Int. Conference on Precipitation, University of Iowa, Iowa City, "A family of rain rate probability distributions," April 26-28, 1993.
7. 5th Latin American Congress of Probability and Mathematical Statistics, University of Sao Paulo, Brazil. "A challenge of a NASA earth probe mission...," June 28-July 3, 1993.
8. Oxford University, England, Statistics Seminar on higher order crossings, Oct. 28, 1993.
9. Warsaw Polytechnic, Warsaw, Poland, Two talks, 2 hours each, on Higher Order Crossings and Threshold Method, Nov. 3,4, 1993.
10. CIMAT, Guanajuato, Mexico, Invited to give lectures on higher order crossings, July 21-Aug. 1, 1994.
11. Invited Guest Speaker, Washington-Baltimore Section of SIAM semiannual Dinner: "Mathematics in Meteorology: Stochastic Modeling and the Lognormal Mystery," April 27, 1995, UMD, College Park, Maryland.
12. 19th International Conf. of the IEEE EMB Soc., Chicago, "Higher order crossings," 10.31.1997.
13. Five lectures (1.5 hrs. each) on higher order crossings, International Summer School on Randomness and Nonlinearity, Uppsala Univ., Sweden, August 18-22, 1997.
14. Short course (6 hrs.) on "Statistical problems in environmental research," Catholic Univ. of Leuven, Belgium, June 23-24, 1998.
15. Three lectures, Swiss Federal Institute of Technology, Lausanne (EPFL), April 26 (CM), 27 (CI), 28 (BTG), 2000.

16. Semiparametric filtering in speech processing, Workshop on Mathematical Foundations of Speech Processing and Recognition, IMA, Univ. of Minnesota, Minneapolis, MN, Sept. 18-22-2000.
17. Two hrs, Categorical time series, Network Modeling and Simulation Summer Workshop, Dartmouth, NH, July 22, 2002.
18. Two talks at the Institute of Statistical Mathematics, Tokyo, Japan, Sept. 2, 2002: a. Time Series Analysis by Higher Order Crossings. b. A Semiparametric Generalization of the t and F Tests.
19. Bayesian Transformed Gaussian Random Field: A Review, Japan Joint Statistical Meeting, Meisei Univ., Tokyo, Japan, Sept. 9, 2002.
20. HOC, 2nd Intn'l Workshop in Appl. Probability - IWAP 2004, Univ. of Piraeus, Greece, March 22-25, 2004.
21. Time Series Prediction via Density Ratio Modeling, Intn'l Conf. on the Future of Statistics, Practice and Education, ISB, Hyderabad, India, 12.29.04-01.01.05.
22. Statistical Spatial/Temporal Interpolation, Applied Mathematics and CS Dept., Weizmann Institute of Science, Rehovot, Israel, Aug. 22, 2006.
23. Plenary speaker, Time Series Analysis by Higher Order Crossings, SCRA 2006-FIM XIII, Thirteenth International Conference of Forum for Interdisciplinary Mathematics, Tomar, Portugal, September 1-4, 2006.
24. Semiparametric Regression Based on Multiple Sources, International Conference on Advances in Interdisciplinary Statistics and Combinatorics, Greensboro, NC, October 5-7, 2012.
25. Thinking Out of the Sample: The Use of "Fake" Data in the Estimation of Small Tail Probabilities in Food Safety and Bio-Surveillance, Central Bureau of Statistics, Jerusalem, Israel, August 20, 2015.
26. Canadian Statistical Society Address (invited address 1hr; joint with V. De Oliveira): "Density Ratio Model: Bayesian Extension and Augmented Reality," 46th Annual Meeting of the Canadian Statistical Society, McGill Univ, Montreal, June 6, 2018.
27. Waseda University, Tokyo, Japan, Waseda Cherry Blossom Workshop, 3 talks, HOC, GLM, ROSF, March 18, 2019.

PhD Advisees

G. Reed (1993), D.E.K. Martin (1990), S.R.C. Lopes (1991), H. Pavlopoulos (1991), J. Troendle (1991), T. Li (1992), K. Fokianos (1996), J.T. Barnett (1996), V. De Oliveira (1997), N. Jeffries (1998), B. Kozintsev (1999), R. Gagnon (2005), H. Guo (2005), G. Lu (2007), S. Wen (2007), M. Nagem (2009), R. Sur (2011), A. Voulgaraki (2011), W. Zhou (2013), K. Dayaratna (2014), L. Pan (2016), L. Yu (2017), C. Wang (2018).