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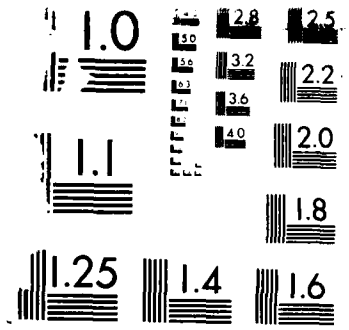

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SUMMARY OF ACCOMPLISHED WORK UNDER THE AIR FORCE GRANT AFOSR-83-0229

P.I. : Dr. P. Papantoni-Kazakos
The University of Connecticut
Period: July 1, 1983 to July 31, 1985

Part of the accomplished work is summarized in the following reports submitted to AFOSR:

H. Tsaknakis, D. Kazakos and P. Papantoni-Kazakos, "Robust Prediction and Interpolation for Vector Stationary Processes-2d Enriched Version", The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-83-10, July 1983.

H. Tsaknakis and P. Papantoni-Kazakos, "Robust Linear Filtering for Multi-variable Stationary Time Series-2d Enriched Version", The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-83-9, July 1983.

M. Georgiopoulos and P. Papantoni-Kazakos, "Random Access Algorithm Utilizing Control Mini Slots", The University of Connecticut, Department of Electrical Engineering and Computer Science, Technical Report TR-83-14, August 1983.

P. Papantoni-Kazakos, "Qualitative Robustness in Time Series", The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-83-15, November 1983.

L. Georgiadis and P. Papantoni-Kazakos, "A High Throughput Limited Sensing Protocol", The University of Connecticut, Department of Electrical Engineering and Computer Science, TR-84-1, February 1984.

L. Georgiadis and P. Papantoni-Kazakos, "Limited Feedback Sensing Algorithms for the Broadcast Channel", The University of Connecticut, Department of Electrical Engineering and Computer Science, TR-84-8, June 1984.

H. Tsaknakis, D. Kazakos, and P. Papantoni-Kazakos, "Robust Prediction and Interpolation for Vector Stationary Processes-Part 3", The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-84-11, October 1984.

H. Tsaknakis and P. Papa..toni-Kazakos, "Robust Linear Filtering for Multi-variable Stationary Time Series - Part 3", The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-84-12, October 1984.

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "An Asynchronous Stack Algorithm for CSMA and CSMA-CD Channels," The University of Connecticut, Department of Electrical Engineering and Computer Science, Technical Report TR-84-13, November 1984.

L. Georgiadis and P. Papantoni-Kazakos, "Ergodicity and Steady-State Equilibrium Conditions for Markov Chains," The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-85-1, January 1985.

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "High Performance Asynchronous Limited Sensing Algorithms for CSMA and CSMA-CD Channels," The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-85-2, January 1985.

L. Georgiadis and P. Papantoni-Kazakos, "A 0.487 Throughput limited Sensing Algorithm," The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-85-3, March 1985.

L. Georgiadis, L. Merakos, and P. Papantoni-Kazakos, "Unified Method for Delay Analysis of Random Multiple Access Algorithms," The University of Connecticut, Department of Electrical Engineering and Computer Science, UCT/DEECS/TR-85-8, August 1985.

In short, some of the significant contributions made in the July 1, 1983 to November 30, 1985 period are summarized as follows:

1. We formulated a theory for robust filtering and smoothing, that combines the qualitative robustness theory with the theory of saddle-point games. ~~On the basis of~~ this theory, ~~we found~~ robust filters for certain contaminated classes of stochastic processes. We recently modified our qualitative robustness for general time series operations. We proposed then breakdown point and sensitivity measures, and in conjuction with saddle-point game theoretic results, we determined robust classes of filters, predictors, and interpolators.

2. We designed robust predictors, interpolators, and filters, for various classes of vector stationary processes with contaminated spectra. We extensively analyzed the above operations, and we produced measures of breakdown points and curves, efficiency, and performance variation within the classes.

3. We designed and analyzed a variety of multiple-access transmission protocols, for various levels of available feedback and feedback sensing. In our studies ~~we~~ included asymptotically-many user models. We devised limited sensing algorithms, with the highest existing throughput, to this point in time, and with robust characteristics in the presence of feedback errors.

4. We devised a unified methodology for the delay analysis of a big variety of random-access algorithms.

Publications

Journal Papers:

D. Kazakos and P. Papantoni-Kazakos, "Modeling of Multidimensional Signals with Applications to Images",
in Progress in Multidimensional Systems Theory, Marcel Dekker, N.Y., 1985.

P. Papantoni-Kazakos, "Some Aspects of Qualitative Robustness in Time Series," in Robust and Nonlinear Time Series Analysis, Lecture Notes in Statistics, Vol. 26, Springer-Verlage, 1985.

M. Georgiopoulos and P. Papantoni-Kazakos, "Collision Resolution Protocols Utilizing Absorptions and Collision Multiplicities", IEEE Trans. Commun., 33(7), July 1985, pp. 721-724.

P. Papantoni-Kazakos, "A Game Theoretic Approach to Robust Filtering", Information and Control, Vol. 60, pp. 1735-1757, 1984.

L. Georgiadis and P. Papantoni-Kazakos, "Limited Feedback Sensing Algorithms for the Broadcast Channel", IEEE Trans. Inform. Th., Special issue on Random Access Communications, March 1985, IT-31, pp. 280-294.

R. K. Bansal and P. Papantoni-Kazakos, "An Algorithm for Detecting a Change in Stochastic Process," IEEE Trans. Inform. Theory. March 1986, to appear.

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "High Performance Asynchronous Limited Sensing Algorithms for CSMA and CSMA-CD Channels," Journal of Telecommunications, Special Issue on Local Area Networks. 1986, to appear.

H. Tsaknakis and P. Papantoni-Kazakos," Robust Linear Filtering for Multivariable Stationary Times Series," IEEE Trans. Automatic Control, 1986, to appear.

H. Tsaknakis, D. Kazakos, and P. Papantoni-Kazakos," Robust Prediction and Interpolation for Vector Stationary Processes", Automatica, to appear.

Papers Submitted to Journals

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "Collision Resolution Protocols for Random Access Channels with Bandwidth and Energy Overhead,"

L. Georgiadis and P. Papantoni-Kazakos, "A 0.487 Throughput Limited Sensing Algorithm,"

L. Georgiadis, L. Merakos, and P. Papantoni-Kazakos," A Unified Method for Delay Analysis of Random Multiple Access Algorithms,"

Conference Proceedings Papers:

P. Papantoni-Kazakos, "Performance Bounds in Robust Filtering and Smoothing", 1983 International Symposium on Information Theory, Montreal, Canada.

P. Papantoni-Kazakos, G. D. Marcus, and M. Georgiopoulos, "A Collision Resolution Protocol with Limited Channel Sensing-Finitely Many Users", IEEE Globecom'83, Nov. 1983.

H. Tsaknakis, D. Kazakos, and P. Papantoni-Kazakos, "Robust Prediction and Interpolation for Vector Stationary Processes", 1983 International Symposium on Information Theory, Montreal, Canada.

P. Papantoni-Kazakos, "Qualitative Robustness in Time Series Analysis", Workshop on Robust and Nonlinear Methods in Time Series Analysis, Heidelberg, West Germany, Sept. 1983.

L. Georgiadis and P. Papantoni-Kazakos, "A Free Access Collision Resolution Algorithm for the Slotted Broadcast Channel", 1984 Conf. on Information Sciences and Systems, Princeton, March.

H. Tsaknakis and P. Papantoni-Kazakos, "Robust Linear Filtering for Multi-variable Stationary Time Series", 1984 Conf. on Information Sciences and Systems, Princeton, March.

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "Collision Resolution Protocols for Random Access Channels with Bandwidth and Energy Overhead," IEEE GLOBECOM "84, Nov. 1984.

M. Georgiopoulos, L. Merakos, and P. Papantoni-Kazakos, "An Asynchronous Stack Algorithm for CSMA and CSMA-CD Channels," INFOCOM '85.

L. Georgiadis and P. Papantoni-Kazakos, "Limited Sensing Random Access Protocols" 1985 International Symposium on Information Theory, Brighton, England.

L. Georgiadis, L. Merakos, and P. Papantoni-Kazakos, "A Unified Method for Delay Analysis of Random Multiple-Access Algorithms," GLOBECOM '85 Proceedings.

L. Merakos and P. Papantoni-Kazakos, "Limited Sensing Algorithms for Communication Networks using Carrier-Sense Multiple Access Channels," 1985 C^3 Workshop Proceedings, MIT.

L. Georgiadis and P. Papantoni-Kazakos, "Limited Sensing Algorithms for the Broadcast Channel," ICC'85, June 1985.

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