

PANAGIOTIS TSIAMYRTZIS

Associate Professor
Department of Statistics
Athens University of Economics & Business

Business Address

Athens University of Economics and Business
Department of Statistics
76 Patission Street
Athens 104 34, Greece
Telephone: +30-210-8203926
E-mail: pt@aueb.gr

Appointments

2014 –	Tenured Associate Professor , Athens Univ. of Econ. & Business, Dept. of Statistics
2014 – 2017	Research Associate Professor , University of Houston, Dept. of Computer Science
2011 – 2014	Research Assistant Professor , University of Houston, Dept. of Computer Science
2009 – 2014	Assistant Professor , Athens University of Economics and Business, Dept. of Statistics
2007 – 2011	Adjunct Assistant Professor , University of Houston, Dept. of Computer Science
2004 – 2009	Lecturer , Athens University of Economics and Business, Dept. of Statistics
2001 – 2004	Visiting Lecturer , Athens Univ. of Economics and Business, Dept. of Statistics
2000 – 2001	Military Service , Greek Army (compulsory service)
2000 – 2000	Visiting Assistant Professor , University of Minnesota, School of Statistics
1999 – 1999	Student Intern , Honeywell Labs, Minneapolis, Minnesota
1998 – 1999	Instructor , University of Minnesota, School of Statistics

Degrees

University of Minnesota, School of Statistics, Twin Cities, Minnesota

Ph.D. in Statistics, 1997–2000.

Title: Bayesian Approach to Quality Control Problems. Advisor: Douglas M. Hawkins.

Committee: Seymour Geisser (Chair), Bradley P. Carlin, Charles Geyer.

University of Minnesota, School of Statistics, Twin Cities, Minnesota

M.Sc. in Statistics, 1995–1997

Aristotle University of Thessaloniki, Dept. of Mathematics, Thessaloniki, Greece

B.Sc. in Mathematics, 1990–1994

Research Interests

- (Bayesian) Statistical Process Control/Monitoring
- Statistical Aspects of Computational Physiology Problems

Research Awards

1. Winner of the “Best Talk Award”, at the ENBIS 7 (European Network for Business and Industrial Statistics), Dortmund, Germany, September 2007.
2. Winner of the “Best Contributed Paper Award” of the American Statistical Association, Section of Risk Analysis, Indianapolis, August 2000
(<http://community.amstat.org/riskanalysissection/awards/studentaward/previouswinners>).
3. Winner of the “Best Student Paper Award” of the American Statistical Association, Section of Risk Analysis, Indianapolis, August 2000
(<http://community.amstat.org/riskanalysissection/awards/paperaward/previouswinners>).
4. Student Travel Award from the “Joint Research Conference on Statistics in Quality, Industry and Technology”, Seattle, June 2000.
5. University of Minnesota, School of Statistics, Spring Semester Fellowship, March 1996.

Publications

Book Contributions

- B04.** J. Dowdall, I. Pavlidis, and P. Tsiamyrtzis (2009), “Coalitional Tracker for Deception Detection in Thermal Imagery”, in Augmented Vision Perception in Infrared: Algorithms and Applied Systems, Series: Advances in Pattern Recognition, editor: Hammoud, R. I., Springer, Chapter 5, pp. 113-136.
- B03.** P. Tsiamyrtzis and D.M. Hawkins (2007), “Bayesian Statistical Process Control”, in Encyclopedia of Statistics in Quality and Reliability, editors: F. Ruggeri, F. Faltin and R. Kenett, John Wiley & Sons, Ltd.
- B02.** P. Tsiamyrtzis and D.M. Hawkins, (2006), “A Bayesian Approach to Statistical Process Control”, in Bayesian Monitoring, Control and Optimization, editors: B. M. Colosimo and E. Del Castillo, Chapman and Hall/CRC Press Inc. Chapter 3, pp. 87-107.

- B01.** I. Pavlidis, P. Tsiamyrtzis, C. Manohar, and P. Buddharaju, (2006), “Biometrics: face recognition in thermal infrared”, in Biomedical Engineering Handbook, editor: J. D. Bronzino, CRC Press, Chapter 29, pp. 1-16.

Papers in Refereed Journals

- J30.** I. Pavlidis, A. Khatri, P. Buddharaju, M. Manser, R. Wunderlich, E. Akleman, P. Tsiamyrtzis (2018), “*Biofeedback arrests sympathetic and behavioral effects in distracted driving*” IEEE Transactions on Affective Computing, [Impact Factor: **4.585**], to appear in print (available online).
- J29.** I. Pavlidis, I. Garza, P. Tsiamyrtzis, M. Dcosta, J. W. Swanson, T. Krouskop and J. Levine (2018), “*Dynamic quantification of migrainous thermal facial patterns- A Pilot Study*”, IEEE Journal of Biomedical and Health, [Impact Factor: **3.850**], to appear in print (available online).
- J28.** I. Karapanagiotis, S. Sotiropoulou, S. Vasileiadou, E. Karagiannidou, D. Mantzouris, P. Tsiamyrtzis (2018), “Shellfish purple and gold threads from a Late Antique tomb excavated in Thessaloniki”, Arachne vol. 5, pp. 64-77.
- J27.** P. Tsiamyrtzis (2017), “Discussion of the paper Statistical transfer learning: a review and some extensions to statistical process control”, Quality Engineering, to appear [Impact Factor **1.295**]
- J26.** S. Taamneh, P. Tsiamyrtzis, M. Dcosta, P. Buddharaju, A. Khatri, M. Manser, T. Ferris, R. Wunderlich & I. Pavlidis (2017), “A multimodal dataset for various forms of distracted driving”, NATURE, Scientific Data, vol. 4, 2017, available on line at: <https://www.nature.com/articles/sdata2017110> [Impact Factor **TBA**]
- J25.** I Pavlidis, M Dcosta, S Taamneh, M Manser, T Ferris, R Wunderlich, E Akleman, P Tsiamyrtzis (2016), “Dissecting Driver Behaviors Under Cognitive, Emotional, Sensorimotor, and Mixed Stressors”, NATURE, Scientific Reports, vol. 6, 2016, available on line at: <http://www.nature.com/articles/srep25651> [Impact Factor **5.578**]
- J24.** I. Semendeferi, P. Tsiamyrtzis, M. Dcosta and I. Pavlidis, (2016), “Connecting Past with Present: A Mixed-Methods Science Ethics Course and its Evaluation”, Science and Engineering Ethics, vol. 22, no. 1, pp. 251-274 [Impact Factor **1.516**].
- J23.** P. Tsiamyrtzis, F. Sobas and C. Négrier, (2015), “Use of prior manufacturer specifications with Bayesian logic eludes preliminary phase issues in quality control: an example in a hemostasis laboratory”, Blood Coagulation & Fibrinolysis, Volume 26, Issue 5, pp. 590-596 [Impact Factor **1.242**].

- J22.** Z.E. Papliaka, A. Konstafnta, I. Karapanagiotis, R. Karadag, A.A. Akyol, D. Mantzouris and P. Tsiamyrtzis, (2015), “FTIR imaging and HPLC reveal ancient painting and dyeing techniques of molluskan purple”, *Archaeological and Anthropological Sciences*, p. 1-12. [*Impact Factor 1.636*]
- J21.** F. Sobas, P. Tsiamyrtzis, N. Benattar, A. Lienhart and C. Négrier, (2014), “A comparison of the I_{2s} rule and Bayesian approach for quality control: application to one-stage clotting factor VIII assay”, *Blood coagulation and Fibrinolysis*, Volume 25, Issue 6, pp. 634-643 [*Impact Factor 1.242*].
- J20.** I. Karapanagiotis, D. Mantzouris, C. Cooksey, M. S. Mubarakand and P. Tsiamyrtzis, (2013), "An improved HPLC method coupled to PCA for the identification of Tyrian purple in archaeological and historical samples", *Microchemical Journal*, Vol. 110, pp. 70–80 [*Impact Factor 2.893*].
- J19.** K. D. Zamba, P. Tsiamyrtzis and D. M. Hawkins (2013), “A three-state recursive sequential Bayesian algorithm for biosurveillance”, *Computational Statistics and Data Analysis*, Vol. 58(1), pp. 82-97 [*Impact Factor 1.179*].
- J18.** Y. Zhou, P. Tsiamyrtzis, P. Lindner, I. Timofeyev, and I. Pavlidis (2013), “Spatio-Temporal Smoothing as a Basis for Facial Tissue Tracking in Thermal Imaging”, *IEEE Transactions on Biomedical Engineering*, Vol. 60, no. 5, pp. 1280-1289 [*Impact Factor 2.233*].
- J17.** I. Pavlidis, P. Tsiamyrtzis, D. Shastri, A. Wesley, Y. Zhou, P. Lindner, P. Buddharaju, R. Joseph, A. Mandapati, B. Dunkin, and B. Bass (2012), “Fast by Nature - How Stress Patterns Define Human Experience and Performance in Dexterous Tasks”, *NATURE, Scientific Reports*, vol. 2, 2012, available on line at: <http://www.nature.com/srep/2012/120306/srep00305/full/srep00305.html> [*Impact Factor 5.578*].
- J16.** D. Shastri, M. Papadakis, P. Tsiamyrtzis, B. Bass, and I. Pavlidis (2012), “Perinatal Imaging of Physiological Stress and Its Affective Potential”, *IEEE Transactions on Affective Computing*, vol. 3, no. 3, p. 366-378 [*Impact Factor 3.466*].
- J15.** P. Tsiamyrtzis and D. M. Hawkins (2010), “Bayesian Start up Phase Mean Monitoring of an Autocorrelated Process that is Subject to Random Sized Jumps”, *Technometrics*, Vol. 52(4), pp. 438-452 [*Impact Factor 1.435*].
- J14.** F. Sobas, A. Bellisario, P. Tsiamyrtzis, A. Lienhart, C. Nougier and C. Negrier (2010), “Bayesian logic in statistical test control: application to coagulation factor VIII assay”, in *Blood coagulation and Fibrinolysis*, Volume 21, Issue 3, pp. 289-295 [*Impact Factor 1.242*].
- J13.** I. Pavlidis, J. Levine, L. MacBride, Z. Zhu, and P. Tsiamyrtzis (2009), “Description and clinical studies of a device for the instantaneous detection of

- office-place stress”, in *WORK: A Journal of Prevention, Assessment, and Rehabilitation*, vol. 34, no. 3, pp. 359-364 [*Impact Factor 0.715*].
- J12.** D. Shastri, A. Merla, P. Tsiamyrtzis, and I. Pavlidis (2009), “Imaging facial signs of neuro-physiological responses”, in *IEEE Transactions on Biomedical Engineering*, Volume 56, no. 2, pp. 477-84 [*Impact Factor 2.347*].
- J11.** P. Tsiamyrtzis and D. M. Hawkins (2008), “A Bayesian EWMA Method to Detect Jumps at the Start-Up Phase of a Process”, in *Quality and Reliability Engineering International*, Volume 24, Issue 4, pp. 721-735 [*Impact Factor 1.435*].
- J10.** K. D. Zamba, P. Tsiamyrtzis and D. M. Hawkins (2008), “A Sequential Bayesian Control Model for Influenza-Like-Illnesses and Early Detection of Intentional Outbreaks”, in *Quality Engineering*, Volume 20, Issue 4, pp. 495-507 [*Impact Factor 0.883*].
- J09.** D. Karlis and P. Tsiamyrtzis (2008), “Exact Bayesian modeling for bivariate Poisson data and extensions”, in *Statistics and Computing*, Volume 18, Issue 1, pp.27-40 [*Impact Factor 1.786*].
- J08.** P. Buddharaju, I. Pavlidis, P. Tsiamyrtzis, and M. Bazakos, (2007), “Physiology-based face recognition in the thermal infrared spectrum”, in *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Volume 29, Issue 4, pp. 613-626 [*Impact Factor 7.534*].
- J07.** J. Dowdall, I. Pavlidis, and P. Tsiamyrtzis, (2007), “Coalitional tracking”, in *Computer Vision and Image Understanding*, Volume 106, Issue 2-3, pp. 205-219 [*Impact Factor 2.838*].
- J06.** P. Tsiamyrtzis, J. Dowdall, D. Shastri, I. Pavlidis, and M.G. Frank, (2007), “Imaging facial physiology for the detection of deceit”, in *International Journal of Computer Vision*, Volume 71, Issue 2, pp. 197-214 [*Impact Factor 6.986*].
- J05.** P. Tsiamyrtzis and D. M. Hawkins, (2005), “A Bayesian scheme to detect changes in the mean of a short run process”, in *Technometrics*, Volume 47, Issue 4, pp. 446-456 [*Impact Factor 1.435*].
- J04.** P. Tsiamyrtzis and D. Karlis, (2004), “Strategies for efficient computation of multivariate Poisson probabilities”, in *Communications in Statistics, Simulation and Computation*, Volume 33 Issue 2, pp.271-292 [*Impact Factor 0.397*].
- J03.** E. Katsanidis, D. Meyer, P. Adis, E. Yancey, M. Dikeman, P. Tsiamyrtzis, M. Pullen, (2003), “Vascular infusion as a means to improve the antioxidant – prooxidant ratio of beef”, *Journal of Food Science*, Volume 68 Issue 4, pp.1149 – 1154 [*Impact Factor 1.649*].

- J02.** V. Morellas, I. Pavlidis, and P. Tsiamyrtzis, (2003), “Deter: Detection of Events for Threat Evaluation and Recognition”, in Machine Vision and Applications, Volume 15, Issue 1 pp. 29-45 [*Impact Factor 1.691*].
- J01.** I. Pavlidis, V. Morellas, P. Tsiamyrtzis, and S. Harp, (2001), “Urban surveillance systems: From the laboratory to the commercial world”, in Proceedings of the IEEE, Volume 89, Issue 10, pp. 1478-97 [*Impact Factor 6.233*].

Papers at Refereed Conferences

- C25.** P. Tsiamyrtzis, M. Dcosta, D. Shastri, E. Prasad and I. Pavlidis (2016), “Delineating the Operational Envelope of Mobile and Conventional EDA Sensing on Key Body Locations”. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems (CHI), May 7-12, 2016. San Jose, California. [*Acceptance Rate: 23.4%*].
- C24.** A. Khatri, D. Shastri, P. Tsiamyrtzis, I. Uyanik, E. Akleman, and I. Pavlidis (2016), “Effects of simple personalized goals on the usage of a physical activity app”. CHI’16 Extended Abstracts on Human Factors in Computing Systems, May 7-12, 2016. San Jose, California. [*Acceptance Rate: 43.4%*]
- C23.** M. Dcosta, D. Shastri, P. Tsiamyrtzis, and I. Pavlidis (2016), “Turning security monitoring into an engaging high performance task”. 2016 IEEE International Conference on Technologies for Homeland Security. San Jose, California, May 10-12, 2016. Waltham, Massachusetts.
- C22.** M. Ugur, D. Shastri, P. Tsiamyrtzis, M. Dcosta, A. Kalpakci, C. Sharp and I. Pavlidis (2015), “Evaluating smartphone-based user interface designs for a 2D psychological questionnaire”. The 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, September 7-11 2015. [*Acceptance Rate: 22%*]
- C21.** I. Uyanik, A. Khatri, P. Tsiamyrtzis and I. Pavlidis, (2014). “Design and Usage of an Ozone Mapping App”, Proceedings of the Wireless Health 2014 on National Institutes of Health, Bethesda, Maryland, pp. 1-7, October 29-31, 2014. [*Acceptance Rate: 25%*]
- C20.** I. Uyanik, D. Price, P. Tsiamyrtzis, and I. Pavlidis (2013), “Interfacing Real-Time Ozone Information”, ACM SIGSPATIAL GIS International Workshop on Interacting with Maps (MapInteract), Orlando FL, pp.20-23, 2013.
- C19.** I. Garza, H. Montakhabi, P. Linder, P. Tsiamyrtzis, J.W. Swanson, L. MacBride, T.A. Krouskop, and I. Pavlidis, (2013), “The face of migraine: thermal imaging revisited”, American Academy of Neurology 65th Annual Meeting, March 2013.

- C18.** I. Uyanik, P. Lindner, P. Tsiamyrtzis, D. Shah, N. Tsekos, I. Pavlidis (2013), “Applying a Level Set Method for Resolving Physiologic Motions in Free-Breathing and Non-gated Cardiac MRI”, Proceedings of the 7th International Conference on Functional Imaging and Modeling of the Heart – FIMH 2013, Sébastien Ourselin, editors, vol. 7945, Springer Berlin, pp. 466-473, 2013.
- C17.** D. Duong, D. Shastri, P. Tsiamyrtzis, and I. Pavlidis (2012), “Spatiotemporal Reconstruction of the Breathing Function”, International Conference on Medical Image Computing and Computer Assisted Intervention – MICCAI 2012, Lecture Notes in Computer Science, vol. 15, pp.149-156, 2012 [*Acceptance Rate: 31.8%*].
- C16.** Y. Zhou, E. Yeniarras, P. Tsiamyrtzis, N. Tsekos, I. Pavlidis (2010), “Collaborative Tracking for MRI-Guided Robotic Intervention on the Beating Heart”, Proceedings of the 13th International Conference on Medical Image Computing and Computer Assisted Intervention – MICCAI 2010, Lecture Notes in Computer Science, Beijing, China, vol. 6363, pp. 351-358, September 2010 [*Acceptance Rate: 32%*].
- C15.** D. Shastri, Y. Fujiki, R. Buffington, P. Tsiamyrtzis, and I. Pavlidis (2010), “O job, can you return my mojo? Improving human engagement and enjoyment in routine activities”, Proceedings of the 2010 ACM Conference on Human Factors in Computing Systems (CHI), Atlanta, Georgia, April, 2010 [*Acceptance Rate: 22%*].
- C14.** Y. Zhou, P. Tsiamyrtzis, and I. Pavlidis (2009), “Tissue tracking in thermo-physiological imagery through spatio-temporal smoothing”, Proceedings of International Conference on Medical Image Computing and Computer Assisted Intervention – MICCAI 2009, Lecture Notes in Computer Science, vol. 5762, pp. 1092-1099, London, United Kingdom, September 2009 [*Acceptance Rate: 27%*].
- C13.** Y. Fujiki, P. Tsiamyrtzis, and I. Pavlidis (2009), “Making sense of accelerometer measurements in pervasive physical activity applications”, Ext. Abstract of the 2009 ACM Conference on Human Factors in Computing Systems (CHI), Boston, Massachusetts, April, 2009 [*Acceptance Rate: 25%*].
- C12.** Y. Zhou, P. Tsiamyrtzis, and I. Pavlidis (2008), “A probabilistic template update method for tracking facial tissue in thermal infrared”, Proceedings of the 5th IEEE International Conference on Advanced Video and Signal Based Surveillance, Santa Fe, New Mexico, USA, September 1-3, 2008.
- C11.** Z. Zhu, P. Tsiamyrtzis, and I. Pavlidis (2008), “The segmentation of the supraorbital vessels in thermal imagery”, Proceedings of the 5th IEEE International Conference on Advanced Video and Signal Based Surveillance, Santa Fe, New Mexico, USA, September 1-3, 2008.
- C10.** D. Shastri, P. Tsiamyrtzis, and I. Pavlidis (2008), “Periorbital thermal signal extraction and applications”, Proceedings of the 30th Annual International

- Conference of the IEEE Engineering in Medicine and Biology Society, Vancouver, British Columbia, pp. 102-105, August, 2008.
- C09.** D. Shastri, A. Merla, P. Tsiamyrtzis, and I. Pavlidis (2007), “Imaging facial signs of neuro-physiological responses”, Proceedings of the 10th International Conference on Medical Image Computing and Computer-Assisted Intervention-MICCAI, Brisbane, Australia, October 29 – November 2, 2007 [*Acceptance Rate: 35%*].
- C08.** Z. Zhu, P. Tsiamyrtzis, and I. Pavlidis (2007) “Forehead thermal signature extraction in lie detection”, Proceedings of the 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, pp. 243-246, Lyon, France, August 23-26, 2007.
- C07.** P. Buddharaju, I. Pavlidis and P. Tsiamyrtzis, (2006) “Pose-invariant physiological face recognition in the thermal infrared spectrum”, Proceedings of the 2006 IEEE Conference on Computer Vision and Pattern Recognition, pp. 53-60, New York, June 17-22, 2006 [*Acceptance Rate: 23.3%*].
- C06.** J. Dowdall, I. Pavlidis, and P. Tsiamyrtzis, (2006), “Coalitional tracking in facial infrared imaging and beyond”, Proceedings of the 2006 IEEE Conference on Computer Vision and Pattern Recognition, pp. 134-141, New York, June 17-22, 2006 [*Acceptance Rate: 23.3%*].
- C05.** P. Buddharaju, I. Pavlidis, and P. Tsiamyrtzis, (2005), “Physiology-Based Face Recognition”, in Proceedings of the IEEE International Conference on Advanced Video and Signal based Surveillance, pp. 354-359, Lake Como, Italy, September 15-16, 2005.
- C04.** P. Buddharaju, J. Dowdall, P. Tsiamyrtzis, D. Shastri, I. Pavlidis, and M. G. Frank, (2005), “Automatic THERmal MONitoring System (ATHEMOS) for Deception Detection”, in Video Proceedings of the IEEE Computer Society Conference on Computer Vision and Pattern Recognition, pp 53, San Diego, CA, June 20-25, 2005 [*Acceptance Rate: 21.6%*].
- C03.** P. Tsiamyrtzis, J. Dowdall, D. Shastri, I. Pavlidis, M.G. Frank, and P. Ekman, (2005), “Lie Detection - Recovery of the Periorbital Signal Through Tandem Tracking and Noise Suppression in Thermal Facial Video”, in Proceedings of SPIE Sensors, and Command, Control, Communications, and Intelligence (C3I) Technologies for Homeland Security and Homeland Defense IV, editor: E. M. Carapezza, Vol. 5778, pp. 555-566, Orlando, FL, March 29-31, 2005.
- C02.** R. Murthy, I. Pavlidis, and P. Tsiamyrtzis, (2004), “Touchless Monitoring of Breathing Function”, in Proceedings of the 26th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Vol. 2, pp. 1196-9, San Francisco, CA, September 1-5, 2004.

- C01.** P. Tsiamyrztis, D. M. Hawkins and S. Tatini, (2000) “Statistical Analysis of Salmonellosis Outbreak Data”, in Proceedings of the American Statistical Association (ASA), Section on Statistics and the Environment, pp.62-67, Indianapolis, IN, August 13-17, 2000. (“First Prize of A.S.A. Student Paper Award” and “Best Contributed Paper Award”).

Papers at Abstract Based Conferences & Newsletters

- A6.** F. Sobas, K. Bourazas and P. Tsiamyrztis (2016), “Bayesian strategy in long-term IQC results management: practical interest and compliance with standards”, in External quality Control of diagnostic Assays and Tests (ECAT) Newsletter, 2016.
- A5.** D. Majeti, K. Kwon, P. Tsiamyrztis and I. Pavlidis, (2015), “Dissecting Scholarly Patterns in Biology and Computer Science”, Science of Team Science (SciTS) 2015 Conference, June 3-5 2015. Bethesda, Maryland.
- A4.** P. Tsiamyrztis, F. Sobas and C. Négrier (2014), “How to establish the mean and standard deviation of internal quality control samples to construct control charts. The Bayesian approach with an example of D-dimer”, in External quality Control of diagnostic Assays and Tests (ECAT) Newsletter, pp. 2–4, December 2014.
- A3.** P. Tsiamyrztis and D. M. Hawkins, (2005), “A Bayesian Method to Detect Early Mean Shifts in an Autoregressive Process”, in *Proceedings of the American Statistical Association (ASA), Section on Quality and Productivity*, pp. 1859-1863, Minneapolis, MN, August 7-11, 2005.
- A2.** R. Murthy, I. Pavlidis, and P. Tsiamyrztis, (2005), “Touchless Monitoring of Breath Function”, in *Abstracts of the 22nd Annual Houston Conference on Biomedical Engineering Research*, Houston, TX, February 10-11, 2005.
- A1.** P. Tsiamyrztis, J. Dowdall, D. Shastri, I. Pavlidis, M. G. Frank, and P. Ekman, (2005), "Lie detection: recovery of the periorbital signal through tandem tracking and noise suppression in thermal facial video", in *Abstracts of the 22nd Annual Houston Conference on Biomedical Engineering Research*, Houston, TX, February 10-11, 2005.

Editorial Work:

- Member of the Editorial Board of the “Journal of Quality Technology”
- Member of the Editorial Board of “Quality Engineering”
- Review Editor for Frontiers (<http://www.frontiersin.org/>) an online, open access publishing group:

<http://community.frontiersin.org/people/PanagiotisTsiamyrtzis/56886>

Citations

Public profile in google scholar:

<https://scholar.google.com/citations?user=whp6ZwcAAAAJ&hl=en>

Teaching Experience

- 1. 2002 – today:** Athens University of Economics and Business, Dept. of Statistics
Current Position: Associate Professor
Undergraduate Courses:
 - Introduction to Linear Regression
 - Linear Models
 - Bayesian Statistics
 - Multivariate Statistical Methods
 - Introduction to Programming with R
 - Statistics I*M.Sc. Courses:*
 - Mathematical Statistics
 - Theory of Statistics
 - Probability for Statistics
 - Bayesian Modeling in Statistics
 - Linear Models for Data Analysis I & II
 - Bayesian Statistics
 - Linear Models
 - Analysis of Variance
- 2. 2015 – 16:** M.Sc. in Business Analytics, Department of Management Science and Technology, Athens University of Economics and Business
Position: Associate Professor
M.Sc. Course:
 - Statistics for Business Analytics I

- 3. 2015 – 16:** M.Sc. in Data Science, Department of Computer Science, Athens University of Economics and Business
Position: Associate Professor
M.Sc. Course:

 - Probability and Statistics for Data Analysis
 - Bayesian statistics and simulation methods
- 4. 2017-19:** Hellenic Open University, School of Science and Technology, Quality Management and Technology
Position: Counselor/Instructor (Distance Learning)
MSc Course:

 - Basic Tools and Methods for Quality Control
- 5. 2003–14 & 2015-17:** Hellenic Open University, Dept. of Business Administration
Position: Counselor/Instructor (Distance Learning)
Undergraduate Course:

 - Quantitative Methods
- 6. 2014:** Specialization program in “Big Data and Business Analytics”, Athens University of Economics and Business (Dept. of Management Science and Technology)
Position: Assistant Professor
Course: Statistics for Data Analytics
- 7. 2004, 2006:** Joint M.Sc. Program in Biostatistics, National and Kapodistrian University of Athens (Medical School and Dept. of Mathematics) and University of Ioannina (Dept. of Mathematics)
Position: Lecturer
M.Sc. Course:

 - Bayesian Statistics
- 8. 2000:** University of Minnesota, School of Statistics, Twin Cities, U.S.A.
Position: Visiting Assistant Professor
Undergraduate Courses:

 - Introduction to Statistics
 - Introduction to Probability and Statistics
- 9. 1999 – 2000:** University of Minnesota, School of Statistics, Twin Cities, U.S.A.
Position: Instructor
Undergraduate Course:

 - Introduction to Statistical Analysis

M.Sc. Course:

 - Applied Linear Regression
- 10. 1996 – 1999:** University of Minnesota, School of Statistics, Twin Cities, U.S.A.

Position: Teaching Assistant

Undergraduate Courses:

- Introduction to Statistics
- Introduction to Statistical Analysis
- Data Analysis

M.Sc. Courses:

- Applied Linear Regression
- Design of Experiments
- Statistical Methods for Quality Improvement

Participation in Grants as Principal Investigator or Senior Scientific Advisor

- 1. Grant: “Monitoring phase I binary data via Bayesian Statistical Process Control”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Research Center AUEB, 2019-20.
- 2. Grant: “Predictive Control Charts: A Bayesian approach in online monitoring”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Research Center AUEB, 2016-18.
- 3. Grant: “Bayesian Statistical Process Control for Phase I count data”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Research Center AUEB, 2015-17.
- 4. Grant: “Bayesian Statistical Process Control for Medical Laboratories”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Werfen – France
- 5. Grant: “Bayesian Statistical Process Control for fraction non-conforming”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Basic Research Funding Program, 2010-11, AUEB.
- 6. Grant: “Bayesian Statistical Process Control for Count Type Data”**
Principal Investigator: Panagiotis Tsiamyrtzis
Sponsor: Basic Research Funding Program, 2009-10, AUEB.
- 7. Grant: “ATHEMOS – Advanced Technology Development”**
Principal Investigator: Ioannis Pavlidis
Sponsor: Defense Academy for Credibility Assessment (DACA), Department of Defense, USA.
Description: The goal of this project was to perform research that would improve facial tissue tracking in thermal infrared, develop tracking error estimation methods, include novel psycho-physiological channels in lie detection, pursue an

aggressive program of experimental investigation, and revamp the ATHEMOS software infrastructure.

8. Grant: “Interacting with Human Physiology”

Principal Investigator: Ioannis Pavlidis

Sponsor: National Science Foundation (NSF), USA

Description: The project aims to add a new dimension in human-computer interaction (HCI), namely, to monitor the physiology of computer users on a continuous basis and take appropriate actions when warranted. The project aspires to use the abundant computing resources at home and the office in combination with novel sensing, algorithmic, and interface methods to enhance the user's experience and at the same time create a new preventive medicine paradigm.

Synergistic Activities

1. Member of the organizing & scientific committees of the 5th Meeting on Statistics, Aegina, 06-08 September 2019, Greece.
2. Member of the Scientific Committee of the “e-learning” unit of Athens University of Economics and Business (2015-2018).
3. Member of the Program Committee of the “ACM Workshop on Multimodal Deception Detection (WMDD 2015)”, ACM 17th International Conference on Multimodal Interaction, ICMI 2015, Seattle, WA, November 9-13, 2015.
4. Program Area Chair (Tracking), of the “5th IEEE International Conference on AVSS” (Advanced Video and Signal Based Surveillance), Santa Fe, New Mexico, USA, September 2008.
5. Member of the organizing & scientific committees of the 8th annual conference of the European Network for Business and Industrial Statistics (ENBIS), September 2008, Athens, Greece.
6. Member of the organizing committee of the 17th annual conference of the Hellenic Statistical Institute (HSI), April 2004, Lefkada, Greece.

Refereeing Service (in alphabetic order):

1. ACM Workshop on Multimodal Deception Detection 2015
2. Applied Optics
3. BMC Medical Imaging
4. Communications in Statistics – Simulation and Computation

5. Communications in Statistics – Theory and Methods
6. Computational and Mathematical Methods in Medicine
7. Computer and Industrial Engineering
8. Computer Vision and Image Understanding
9. European Journal of Operational Research
10. Flexible Services and Manufacturing Journal
11. Forensic Science International
12. Frontiers in Human Neuroscience
13. Health Services and Outcomes Research Methodology
14. Hellenic Institute of Statistics
15. IEEE Computer Society Workshop on Biometrics
16. IEEE International Conference on Advanced Video and Signal Based Surveillance
17. IEEE Transactions on Image Processing
18. IEEE Transactions on Information Forensics and Security
19. IEEE Transactions on Information Technology in BioMedicine
20. IEEE Transactions on Pattern Analysis and Machine Intelligence
21. IET Computer Vision
22. IIE Transactions
23. International Journal of Pattern Recognition and Artificial Intelligence
24. International Journal of Production Research
25. Journal of Quality Technology
26. Mathematics and Computers in Simulation
27. Measurement Science and Technology – Institute of Physics
28. Metron
29. National Science Foundation

30. Optimization
31. Quality Engineering
32. Quality Technology and Quantitative Management
33. Scientia Iranica
34. Statistical Papers
35. Statistical Science
36. Statistics and Computing
37. Technometrics
38. TEST

Short courses

1. “Quality assurance of the total testing process”, 2018 ECAT (External quality Control of diagnostic Assays and Tests), Leiden, Holland, November 07-09, 2018 (<https://www.ecat.nl/wp-content/uploads/2019/02/2019-14-Participants-Meeting-2018-Final.pdf>).
2. “Internal Quality Control: Assessing the proper QC values and limits”, 2016 ECAT (External quality Control of diagnostic Assays and Tests), Leiden, Holland, November 09-11, 2016 (http://www.ecat.nl/wp-content/uploads/2017/02/Issue-11-Participants-Meeting-2016_final.pdf).
3. “An Introduction to Bayesian Statistical Process Control”, 2014 Joint Research Conference, University of Washington, Seattle, WA, USA, June 23, 2014 (<http://asa-qprc.org/2014/www.jrc2014.org/short-courses.html>).
4. “Workshop on Bayesian Modeling using Winbugs”, Athens, Greece, August 24-25, 2010 (<http://www.math.ntua.gr/~fouskakis/Workshop/home.html>).

Invited Talks/Conferences/Seminars

1. Invited at the Stu Hunter Research Conference 2019, Induno Olona, Italy, February 17-20, 2019.
2. “How to evaluate your z-score?”, 2018 ECAT (External quality Control of diagnostic Assays and Tests), Leiden, Holland, November 07-09, 2018

3. “Statistical process control and monitoring in the big data era”, 2018 ISBIS Meeting, Piraeus, Greece, July 04-06, 2018.
4. Invited at the Stu Hunter Research Conference 2018, Roanoke Virginia, USA, March 05-08, 2018.
5. “Statistical Process Control and Monitoring: A Bayesian Approach”, Invited Talk, at Werfen, Instrumentation Laboratory, Bedford, USA, April 10 2017.
6. Discussant of the paper “Statistical Transfer Learning with application to SPC”, Stu Hunter Research Conference 2017, Copenhagen, Denmark, March 05-08 2017.
7. “Statistical Process Control and Monitoring: A Bayesian Approach”, Invited Talk, Dept. of Mechanical Engineering, Milan Polytechnic, Milan, Italy, January 29 2016.
8. “Fast by Nature - How Stress Patterns Define Human Experience and Performance in Dexterous Tasks”, National Center for Scientific Research "Demokritos", Summer School, Jul. 2015
(<http://www.blod.gr/lectures/Pages/viewlecture.aspx?LectureID=2196#>)
9. “Bayesian Statistical Process Control for count data”, 4th International Symposium on Statistical Process Monitoring (ISSPM 2015), Padua, Italy, July 07-09 2015.
10. “A Bayesian statistical process control approach in modeling count type data”, Imaging Seminar, Department of Mathematics, University of Houston, TX, USA, May 04 2015,
11. “Bayesian Statistical Process Control for fraction non-conforming”, 2013 International Symposium on Statistical Process Control (ISSPC3), Piraeus, Greece, July 09-11 2013.
12. “Internal quality control monitoring from a Bayesian perspective”, 2012 ECAT (External quality Control of diagnostic Assays and Tests), Leiden, Holland, November 07-09, 2012.
13. “Fast by Nature - How Stress Patterns Define Human Experience and Performance in Dexterous Tasks”, HUB-Science events, public lecture, Oct. 2012.
14. “Bayesian SPC for Autocorrelated Process that are Subject to Random Sized Jumps”, 2012 Quality & Productivity Research Conference, California State University, Long Beach, CA, USA, June 4-7, 2012.
15. Invited Session organizer (Bayesian Statistical Process Control), at the “2010 Joint Research Conference on Statistics in Quality, Industry, and Technology”, National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA, May 25–27, 2010.

16. "A Bayesian Approach in Modeling an Epidemic", Invited Talk at 2009 International Symposium on Statistical Process Control (ISSPC), Nantes, France, July 16-17 2009.
17. "Bayesian SPC for Count Data", Invited Talk at 2009 Quality & Productivity Research Conference (QPRC), IBM T. J. Watson Research Ctr., Yorktown Heights, NY, USA, June 3-5, 2009.
18. "Detection of Events for Threat Evaluation and Recognition", MSc Program in Information Systems, University of Macedonia, May 2003.
19. "A Cluster Based Approach in Combining MPN and Counting", The Eastern Regional Research Center of the Agricultural Research Service (ARS) of United States Department of Agriculture (USDA), Philadelphia, December 15, 2000.

Conference Presentations

1. "A Bayesian self-starting Shiryaev statistic for Phase I data", 2018 European Network for Business and Industrial Statistics annual conference (ENBIS 18), Nancy, France, September 02-06, 2018.
2. "Bayesian self-starting CUSUM", 2017 European Network for Business and Industrial Statistics annual conference (ENBIS 17), Naples, Italy, September 09-13, 2017.
3. "Bayesian modeling for fraction nonconforming", 2016 European Network for Business and Industrial Statistics annual conference (ENBIS 16), Sheffield, UK, September 11-15, 2016.
4. "A Bayesian approach for online monitoring of phase I data", The 4th International Conference on the Interface between Statistics and Engineering (ICISE2016), Palermo, Italy, June 20-22 2016.
5. "Bayesian Statistical Process Control for count data", 4th International Symposium on Statistical Process Monitoring (ISSPM 2015), Padua, Italy, July 07-09 2015.
6. "Phase I management using Normal Predictive Control Charts", 2014 Joint Research Conference, University of Washington, Seattle, WA, USA, June 24-26, 2014.
7. "Bayesian Statistical Process Control for fraction non-conforming", 2013 International Symposium on Statistical Process Control (ISSPC3), Piraeus, Greece, July 09-11, 2013.

8. "Internal quality control monitoring from a Bayesian perspective", 2012 ECAT (External quality Control of diagnostic Assays and Tests), Leiden, Holland, November 07-09, 2012.
9. "Bayesian SPC for autocorrelated processes that are subject to random jumps", 2011 Quality & Productivity Research Conference (QPRC), Los Angeles, CA, USA, June 4-7, 2012.
10. "A Bayesian Approach to Control Attributes", 2011 Joint Statistical Meetings, Miami, FL, U.S.A., July 30, August 4, 2011.
11. "A Bayesian SPC approach in modeling count type data", 2011 Quality & Productivity Research Conference (QPRC), Roanoke Virginia, USA, June 8-10, 2011.
12. "Bayesian Statistical Process Control for Count Type Data", 28th European Meeting of Statisticians, Piraeus, Greece, August 17-22, 2010.
13. "Controlling Attribute Type Data From a Bayesian Perspective", 2010 Joint Research Conference on Statistics in Quality, Industry, and Technology, National Institute of Standards and Technology (NIST), Gaithersburg, MD, USA, May 25-27, 2010.
14. "Bayesian modeling for fraction nonconforming", 2009 European Network for Business and Industrial Statistics annual conference (ENBIS 9), Gothenburg, Sweden, September 20-24, 2009.
15. "A Bayesian Approach to Model Shifts in Poisson Data", 2008 European Network for Business and Industrial Statistics annual conference (ENBIS 8), Athens, Greece, September 21-25, 2008.
16. "A Probabilistic Template Update Method for Tracking Facial Tissue in Thermal Infrared", 5th IEEE International Conference on Advanced Video and Signal Based Surveillance, Santa Fe, New Mexico, USA, September 1-3, 2008.
17. "The Segmentation of the Supraorbital Vessels in Thermal Imagery", 5th IEEE International Conference on Advanced Video and Signal Based Surveillance, Santa Fe, New Mexico, USA, September 1-3, 2008.
18. "Coalitional Tracking", First Athens – Pavia Meeting in Statistics, Marathonas, Greece, June 3-6, 2008.
19. "A Sequential Bayesian Control Model for Influenza-Like-Illnesses", 2008 Bayesian Biostatistics Conference, Houston, U.S.A., January 30 – February 2, 2008.
20. "A Bayesian EWMA Method to Detect Jumps at the Start-up Phase of a Process", ENBIS 7, Dortmund, September 24-26, 2007. (Winner of the "Best Talk Award")

21. "A Bayesian Approach in Modeling Shifts of the Mean/Variance of Count Data", Joint Statistical Meetings, Seattle, U.S.A., August 5-10, 2006.
22. "A Bayesian Approach to Statistical Process Control", ISBA Eighth World Meeting on Bayesian Statistics, Valencia, Spain, June 1-6, 2006.
23. "A Bayesian Method to Detect Early Mean Shifts in an Autoregressive Process", Joint Statistical Meetings, Minneapolis, U.S.A., August 7-11, 2005.
24. "Touchless Monitoring of Breathing Function", 22nd Annual Houston Conference on Biomedical Engineering Research Huston, February 10 – 11, 2005.
25. "Lie Detection: Recovery of the Periorbital Signal through Tandem Tracking and Noise Suppression in Thermal Facial Video", 22nd Annual Houston Conference on Biomedical Engineering Research Huston, February 10 – 11, 2005.
26. "Exact Bayesian Inference for Bivariate Poisson Data", 19th International Workshop on Statistical Modeling, Florence, 04 – 08 July 2004.
27. "Exact Bayesian Inference for Bivariate Poisson Data", 2nd International Workshop in Applied Probability, Piraeus, 22 – 25 March 2004.
28. "Strategies for Efficient Computation of Multivariate Poisson Probabilities", Recent Advances in Statistical Designs and Related Combinatorics, Athens, 07 – 09 July 2003.
29. "A Bayesian Segmentation Algorithm in D.E.T.E.R. (Detection of Events for Threat Evaluation and Recognition)", 16th annual conference of the Hellenic Statistical Institute (HSI), Kavala, 30 April – 03 May 2003.
30. "Segmentation and Tracking Algorithm for Visualization during MRI-Guided Ablative Thermal Therapy", 20th Annual Houston Conference on Biomedical Engineering Research, Houston, April 3-4, 2003.
31. "Most Probable Number, Counting or Both?", 15th annual conference of the Hellenic Statistical Institute (HSI), Ioannina, 08-11 May 2002.
32. "Bayesian Quality Control", 14th annual conference of the Hellenic Statistical Institute (HSI), Skiathos, 18-21 April 2001.
33. "Statistical Analysis of Salmonellosis Outbreak Data", Joint Statistical Meetings, Indianapolis, August 13-17, 2000. ("First Prize of A.S.A. Student Paper Award" and "Best Contributed Paper Award")
34. "A Bayesian Approach to the Short Run Problem", Joint Research Conference, Seattle, June 26-28, 2000.

Ph.D. students

1. K. Bourazas, “Bayesian Statistical Process Monitoring”, Dept. of Statistics, Athens University of Economics and Business (under development).

M.Sc. students

1. X. Kokkinopoulou, “Statistical Process Control and Monitoring with Big Data”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics (under development).
2. A. Barboutsi, “Multivariate Statistical Process Control methods in medical labs”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics (under development).
3. C. Tsiagianni, “Statistical Process Control in aluminum factory”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics (under development).
4. D. Zekakos Xipolias, “Predicting lactic Acid during physical exercise”, Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics (under development).
5. A. Gerofotis, “Statistical analysis of physiological variables when driving under stress conditions”, Hellenic Open University, School of Science and Technology, MSc in Quality Management and Technology (under development).
6. S. Markou, “Statistical quality control of medical laboratory processes”, Hellenic Open University, School of Science and Technology, MSc in Quality Management and Technology (under development).
7. E. Stratakis, “Statistical analysis of internal combustion engine power failures of steam power station at Linoperamaton”, Hellenic Open University, School of Science and Technology, MSc in Quality Management and Technology (under development).
8. E. Gerogiannakis, “Reliability Analysis and evaluation of Monopulse Secondary Surveillance Radar (MSSR) - Availability specification”, Hellenic Open University, School of Science and Technology, MSc in Quality Management and Technology (under development).
9. K. Mantasas, “Process Risk Assessment of Aircraft Industry of the Hellenic Aerospace Industry”, Hellenic Open University, School of Science and Technology, MSc in Quality Management and Technology (under development).

- 10.** D. Petrovas, “Modeling the delinquency status of restructured residential mortgage loans over a 12 month observation period”, Athens University of Economics and Business, Part Time MSc in Business Analytics.
- 11.** A. Dalentzakis, “Profile monitoring in driving performance using statistical process control methods”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 12.** G. Pantermakis, “Automatic event detection in computational physiology signals using statistical process control methods”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 13.** C. Seizi, “On Divergence between Distribution Functions”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 14.** E. Yiannopoulou, “A Bayesian approach in determining the optimal sample size for phase I data”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 15.** T. Nicolaou, “Spatial Statistics in Image Analysis”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 16.** S. Patrinos, “Bioterrorism Surveillance Systems: An application to gastrointestinal infections” Joint M.Sc. Program in Biostatistics, National and Kapodistrian University of Athens (Medical School and Dept. of Mathematics) and University of Ioannina (Dept. of Mathematics).
- 17.** B. Papathanasiou, “A Bayesian Statistical Process Control in modeling epidemics”, Joint M.Sc. Program in Biostatistics, National and Kapodistrian University of Athens (Medical School and Dept. of Mathematics) and University of Ioannina (Dept. of Mathematics).
- 18.** S. Rafail, “Bayesian approach to Kalman Filter for applications to Meteorology”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 19.** G. Basta, “Biosurveillance Systems: A Bayesian Decision Making Approach”, Joint M.Sc. Program in Biostatistics, National and Kapodistrian University of Athens (Medical School and Dept. of Mathematics) and University of Ioannina (Dept. of Mathematics).
- 20.** D. Kiagias, “Predictive Control charts for discrete data”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.
- 21.** K. Bourazas, “Predictive Control charts for continuous data”, Dept. of Statistics, Athens University of Economics and Business, Full Time MSc in Statistics.

22. M. Douli, "Recommendation Systems: A Content Based Collaboration Filter Approach", Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics.
23. G. Vlassis, "A review of methods used to estimate the central subspace in studying the conditional distribution of $y|x$ in regression", Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics.
24. R. Christopoulou, "Discovering the structural dimension in regression problems", Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics.
25. P. Douva, "Linear Profiles for Phase I data: a review", Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics.
26. V. Vriniotis, "Sentiment Analysis using Statistical Methods", Dept. of Statistics, Athens University of Economics and Business, Part Time MSc in Statistics.

Committee Member in PhD examination

1. "Tracking Tissue in Thermal Infrared Video", Jonathan Dowdall, Department of Computer Science, University of Houston, advisor: Ioannis Pavlidis.
2. "Measurement of Facial Physiology for Lie Detection", Dvijesh Shastri, Department of Computer Science, University of Houston, advisor: Ioannis Pavlidis.
3. "Physiology-Based Face Recognition in the Thermal Infrared Spectrum", Pradeep Buddharaju, Department of Computer Science, University of Houston, advisor: Ioannis Pavlidis.
4. "Breathing Computation through Thermal Imaging", Jin Fei, Department of Computer Science, University of Houston, Advisor: Ioannis Pavlidis.
5. "Applications of Thermal Imaging in Psychology and Medicine", Zhen Zhu, Department of Computer Science, University of Houston, Advisor: Ioannis Pavlidis.
6. "Physical Activity Patterns of Humans - Monitoring, Modeling, and Intervening", Yuichi Fujiki, Department of Computer Science, University of Houston, Advisor: Ioannis Pavlidis.
7. "Deformable Collaborative Tracking Across Imaging Modalities", Yan Zhou, Department of Computer Science, University of Houston, Advisor: Ioannis Pavlidis.

8. "Rank and quantile regression", Zoe Tsourti, Department of Statistics, Athens University of Economics and Business, Advisor: Petros Dellaportas.
9. "Development and study of synthetic diagrams in statistical process control to monitor the mean and variance", University of West Macedonia, Advisor: George Nenes.

References

Available upon request.

Date
March 2019

Bayesian methods provide a rigorous general framework for dynamic state estimation problems. The Bayesian approach is to construct the probability density function (PDF) of the state based on all the available information. For the linear-Gaussian estimation problem, the required PDF remains Gaussian at every iteration of the filter, and the Kalman filter relations propagate and update the mean and covariance of the distribution. For nonlinear or non-Gaussian problems there is no general analytic (closed form) expression for the required PDF. The extended Kalman filter (EKF) is the most popular.