Sokratis Makrogiannis, Ph.D.

Artificial Intelligence | Machine Learning | Computer Vision | Biomedical & Computational Imaging

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Research Leadership Summary

Professor of Artificial Intelligence, Machine Learning, and Biomedical Data Science specializing in computer vision, trustworthy AI, computational imaging, and scientific machine learning. My research develops interpretable and data-driven AI systems for scientific discovery, healthcare innovation, and complex real-world applications.

I have established externally funded interdisciplinary research programs integrating artificial intelligence, mathematical modeling, imaging science, and biomedical applications. My research has been supported by the National Science Foundation (NSF), National Institutes of Health (NIH), Army Research Office (ARO), and other agencies, resulting in collaborations spanning computing, engineering, medicine, biology, and national research organizations.

My research vision emphasizes human-centered and trustworthy AI approaches that combine fundamental machine learning advances with transformative applications in biomedical discovery, environmental sensing, and computational science.

Leadership and Research Highlights

- Research leader in Artificial Intelligence, Machine Learning, Computer Vision, and Biomedical Data Science with more than two decades of research experience.
- PI/Co-PI on NSF, NIH, and ARO funded research programs (≈$4M direct PI/research-PI funding; participation in collaborative research programs exceeding $20M).
- Founder and Director of the Mathematical Imaging and Visual Computing (MIVIC) Laboratory, leading interdisciplinary research programs in AI, computational imaging, and biomedical data science.
- Developed AI-driven imaging biomarkers and computational methodologies for studies of aging, cancer, metabolic disease, cellular systems, and environmental imaging.
- Established interdisciplinary collaborations involving computer science, engineering, mathematics, biomedical sciences, clinical researchers, and national research organizations.
- Mentored 9 Ph.D. graduates, more than 20 M.S. theses, and numerous undergraduate researchers in AI, computational science, and biomedical applications.
- Editorial leadership in international journals spanning artificial intelligence, computer vision, biomedical imaging, and quantitative imaging.
- Recipient of international recognition including the VITM 2024 Best Oral Presentation Award, IEEE ISBI Cell Tracking Challenge top-3 ranking, and Pattern Recognition Most Cited Article Award.

Professional Experience

Professor 08/2023–

Division of Physics, Engineering, Mathematics, and Computer Science (PEMaCS), Delaware State University, Dover, DE
Research leadership in artificial intelligence, machine learning, biomedical imaging, and data science. Established and directed externally funded interdisciplinary research programs supported by NSF, NIH, and ARO. Led collaborations across computing, engineering, biomedical sciences, and clinical research domains. Mentored doctoral, graduate, and undergraduate researchers.

Associate Professor (tenured) 08/2017–08/2023

Division of Physics, Engineering, Mathematics, and Computer Science (PEMaCS), Delaware State University, Dover, DE
Expanded externally funded research programs in artificial intelligence, biomedical imaging, and computational science. Developed interdisciplinary collaborations and supervised graduate research in machine learning, image analysis, and biomedical applications.

Assistant Professor (tenure-track) 08/2013–08/2017

Department of Mathematical Sciences and Department of Physics and Engineering, Delaware State University, Dover, DE
Established the Mathematical Imaging and Visual Computing Laboratory (MIVIC) and initiated research programs in machine learning, computer vision, biomedical image analysis, and computational modeling.

Senior Research Fellow 07/2009–08/2013

Clinical Research Branch, National Institute on Aging (NIA), National Institutes of Health, Baltimore, MD
Developed computational methods for quantitative analysis of CT and MRI imaging data. Conducted research on biomedical image analysis, tissue characterization, and imaging biomarkers for aging-related diseases.

Computer Vision Algorithm Developer 06/2008–06/2009

GE Global Research Center, Visualization and Computer Vision Laboratory, Niskayuna, NY
Developed computer vision and biomedical image analysis methodologies for industrial and healthcare applications.

Principal Scientist 08/2006–05/2008

Molecular Imaging Center of Excellence (MICE), Clinical Pharmacology and Discovery Medicine, GlaxoSmithKline, King of Prussia, PA
Developed quantitative imaging biomarkers and computational analysis methods supporting biomedical research and drug discovery.

Computer Vision Engineer 09/2003–12/2004

Automation, Integration of Information and Systems Inc. (AIIS), Washington Township, OH
Developed image analysis and pattern recognition methodologies for automated analysis of image sequences.

Graduate Research Assistant 02/1998–01/2002

Electronics Laboratory, University of Patras, Patras, Greece
Research on image analysis, computer vision, and computational methods for image segmentation.

Education and Training

Postdoctoral Research Scholarship 08/2005–08/2006

Biomedical Postdoctoral Program, Section of Biomedical Image Analysis, Department of Radiology, University of Pennsylvania, Philadelphia, PA
Research Areas: Brain Imaging, Computational Neuroanatomy.

Postdoctoral Research Scholarship 05/2003–07/2005

ITRI/Computer Science and Engineering Department, Wright State University, Dayton, OH
Research Areas: Image Analysis and Computer Vision Algorithms.

Ph.D. in Physics (Division of Electronics and Computers) 1998–2002

University of Patras, Patras, Greece
Dissertation: *Color Image Segmentation Methods Using Fuzzy Logic, Watershed Analysis, Graph Theory, and Scale Space.*

M.S. in Electronics and Computers 1995–1998

University of Patras, Patras, Greece
Thesis: *Very Low Bit Rate Image and Video Compression Algorithms.*
Selected coursework: Software Theory, Computer Architecture, Computer System Design Using Microprocessors, Networks of Data and Computers, Probability Theory and Linear Algebra, Digital Signal Processing, and Digital Image Processing.

B.S. in Physics, Electronics Concentration 1991–1995

University of Patras, Patras, Greece
Thesis: *Digital Image Compression Using Quadtree Decomposition.*
Selected coursework: Programming, Computational Physics, Numerical Analysis, Microcomputers, Digital Electronics, Probability and Statistics, and Mathematics.

Peer-reviewed Journal Publications

[1] L. C. A. Da Silva, B. Kaymaz, S. Makrogiannis, K. J. Rogers, H. H. Kecskemethy, R. Nikam, J. R. Bowen, S. W. Gould, and M. M. Thacker, "Measurements of acetabular morphology in healthy children using multiplanar computed tomography reconstructions," *Journal of Pediatric Orthopaedics B*, vol. 35, no. 2, pp. 164–172, 2026. DOI: 10.1097/BPB.0000000000001308.

[2] Y. Fan, S. Makrogiannis, R. Zhou, and P. Chen, "Ai for chemical and biomedical imaging: From data acquisition to actionable insight," *Chemical & Biomedical Imaging*, Sep. 2026, ISSN: 2832-3637. DOI: 10.1021/cbmi.6c00198. eprint: https://pubs.acs.org/cbihbp/article-pdf/doi/10.1021/cbmi.6c00198/68546044/cbmi.6c00198.pdf. [Online]. Available: https://doi.org/10.1021/cbmi.6c00198.

[3] N. I. Profili, S. Makrogiannis, M. Marongiu, E. Fiorillo, F. Cucca, and A. P. Delitala, "The association between thyroid function and bone mass density," *Bone*, vol. 213, p. 118 055, 2026, ISSN: 8756-3282. DOI: https://doi.org/10.1016/j.bone.2026.118055. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S8756328226002814.

[4] N. Annasamudram, J. Zhao, O. Oluwadare, A. Prashanth, and S. Makrogiannis, "Scale selection and machine learning based cell segmentation and tracking in time lapse microscopy," *Scientific Reports*, vol. 15, no. 1, p. 11 717, 2025. DOI: https://doi.org/10.1038/s41598-025-95993-w.

[5] C. E. Harris, L. Liu, L. Almeida, C. Kassick, and S. Makrogiannis, "Artificial intelligence in pediatric osteopenia diagnosis: Evaluating deep network classification and model interpretability using wrist x-rays," *Bone Reports*, vol. 25, p. 101 845, 2025, ISSN: 2352-1872. DOI: https://doi.org/10.1016/j.bonr.2025.101845. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S2352187225000221.

[6] S. Makrogiannis, "Editorial: Foundation models for healthcare: Innovations in generative ai, computer vision, language models, and multimodal systems," *Frontiers in Computer Science*, vol. 7, p. 1 744 581, 2025. DOI: https://doi.org/10.3389/fcomp.2025.1744581.

[7] N. V. Annasamudram, A. M. Okorie, R. G. Spencer, R. R. Kalyani, Q. Yang, B. A. Landman, L. Ferrucci, and S. Makrogiannis, "Deep network and multi-atlas segmentation fusion for delineation of thigh muscle groups in three-dimensional water–fat separated MRI," *Journal of Medical Imaging*, vol. 11, no. 5, p. 054 003, 2024. DOI: 10.1117/1.JMI.11.5.054003. [Online]. Available: https://doi.org/10.1117/1.JMI.11.5.054003.

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Peer-reviewed Book Chapters

[52] Y. Wang, O. Williams, N. Annasamudram, and S. Makrogiannis, "Live cell segmentation and tracking techniques," in *Intelligent Video Analytics: Clustering and Classification Applications*, M. Z. El-Sayed M. El-Alfy George Bebis, Ed. CRC Press, 2023, pp. 129–172.

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Peer-reviewed Conference Papers

[58] C. E. Harris, L. Liu, D. A. Kennady, P. R. Bakic, and S. Makrogiannis, "Breast density classification and decision explainability by deep sparse approximations," in *Medical Imaging 2026: Computer-Aided Diagnosis*, A. Wismüller and T. M. Deserno, Eds., International Society for Optics and Photonics, vol. 13926, SPIE, 2026, 139260P. DOI: 10.1117/12.3084578. [Online]. Available: https://doi.org/10.1117/12.3084578.

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Pre-prints and Technical Reports

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External Research Funding

Research Funding Leadership

- Led and contributed to externally funded interdisciplinary research programs supported by the National Science Foundation (NSF), National Institutes of Health (NIH), Army Research Office (ARO), NASA, and state agencies.
- Managed approximately $4M in direct PI/research-PI funding and contributed to collaborative research programs exceeding $20M in total support.
- Research programs span artificial intelligence, machine learning, biomedical imaging, computational biology, cyber-physical systems, environmental sensing, and scientific computing.
- Developed and managed interdisciplinary research collaborations involving computer science, engineering, mathematics, biomedical sciences, clinical researchers, and national research organizations.

National Science Foundation (NSF)

- **Excellence in Research: Mapping of Natural Disasters by Deep Subspace Learning in Multi-band and Multi-spectral Satellite Images**
  NSF Cyber-Physical Systems (CPS) Program. Principal Investigators: S. Makrogiannis, C. Kambhamettu (University of Delaware).
  Role: Principal Investigator. **Status:** Awarded. **Amount:** $911,306; 09/2024–08/2027.
  Research focus: Deep learning, representation learning, and AI-based analysis of multi-modal remote sensing imagery for environmental monitoring and disaster response.
- **CyberOrganoids: Microrobotics-enabled Differentiation Control Loops for Cyberphysical Organoid Formation**
  NSF Cyber-Physical Systems (CPS) Program. Principal Investigators: S. Das, B. Tanner (University of Delaware), R. Weiss (MIT), S. Makrogiannis.
  Role: Co-Principal Investigator. **Status:** Awarded. **Amount:** Total $1,197,575; Makrogiannis allocation $98,394; 09/2023–08/2026.
  Research focus: AI, computational modeling, and cyber-physical approaches for biological systems and organoid engineering.

National Institutes of Health (NIH)

- **Machine Learning-based Imaging Biomarkers for Metabolic and Age-related Diseases**
  NIH National Institute on Minority Health and Health Disparities (NIMHD), Research Centers in Minority Institutions (RCMI) Program. Principal Investigator: M. Harrington. Research Principal Investigator: S. Makrogiannis.
  Role: Research Principal Investigator. **Status:** Awarded. **Amount:** Institute-wide $18,528,631; Makrogiannis research allocation $1,591,540; 06/2022–05/2027.
  Research focus: Machine learning-based quantitative imaging biomarkers, multimodal biomedical data analysis, and AI-assisted characterization of metabolic and aging-related diseases.
- **Image Analysis and Machine Learning Methods for Studies of Aging Phenotypes and Age-related Diseases**
  NIH National Institute of General Medical Sciences (NIGMS).
  Role: Principal Investigator. **Status:** Awarded. **Amount:** $431,401; 06/2021–05/2026.
  Research focus: Development of interpretable machine learning methods and quantitative imaging approaches for biomedical discovery.
- **Quantitative Image Analysis Techniques for Studies of Aging Phenotypes and Age-related Diseases**
  NIH National Institute of General Medical Sciences (NIGMS).
  Role: Principal Investigator. **Status:** Completed. **Amount:** $255,021; 04/2015–03/2019.
  Research focus: Computational imaging methods for tissue characterization and analysis of aging-related phenotypes.
- **Software Development for Image Processing of CT and MRI Scan Data**
  National Institute on Aging (NIA), NIH.
  Role: Principal Investigator. **Status:** Completed. **Amount:** $31,633; 04/2016–04/2017.
  Research focus: Development of computational imaging software for biomedical research applications.

Department of Defense and Other Federal Funding

- **Automated Cell Segmentation, Tracking and Quantitative Analysis: Mathematical Methods and Algorithms**
  Army Research Office (ARO), Technical Area: Modeling of Complex Systems.
  Role: Principal Investigator. **Status:** Awarded. **Amount:** $434,158; 05/2020–04/2024.
  Research focus: AI, computer vision, mathematical modeling, and automated analysis of complex biological systems.
- **Development and Validation of Image Registration Techniques for Remotely Sensed Earth Imagery**
  NASA/EPSCoR Research Infrastructure Development Program.
  Role: Principal Investigator. **Status:** Completed. **Amount:** $21,179; 11/2015–11/2016.
  Research focus: Machine learning and image registration methods for remote sensing applications.

- **Development of a Knowledge Base to Support Detection and Diagnosis and Research in Mammography**
  US Army Research and Development Command / USAMRMC-TATRC. Principal Investigator: K. Agyepong. Co-Principal Investigator: S. Makrogiannis.
  Role: Co-Principal Investigator. **Status:** Completed. **Amount:** $2,500,000.
  Research focus: Computational methods and knowledge-based approaches for mammography detection, diagnosis, and research.
- **Phase I: Detecting and Mining Similarities, Differences and Target Patterns in Sequences of Images Using PFF, LGG and SPNG Approaches**
  Air Force Office of Scientific Research (AFOSR-STTR). Principal Investigator: N. Bourbakis.
  Role: Co-Investigator. **Status:** Completed. **Amount:** $100,000.
  Research focus: Computational image-sequence analysis, pattern detection, and image mining.

State and Institutional Research Support

- **Mathematical Methods and Computer Algorithms for Tissue Quantification and Characterization**
  Delaware Economic Development Office (DEDO), State of Delaware Research and Development Matching Grant Program.
  Role: Principal Investigator. **Status:** Completed. **Amount:** $100,000; 11/2015–11/2017.
  Research focus: Mathematical and computational methods for quantitative tissue analysis and characterization.
- **Center for Research and Education in Optical Sciences and Applications (CREOSA): Promoting Scientific Discoveries, Technological Advances, and STEM Education**
  National Science Foundation. Principal Investigator: N. Melikechi.
  Role: Faculty Researcher. **Status:** Completed. **Amount:** $5,000,000; 09/2012–08/2017.
  Research focus: Interdisciplinary research, optical sciences, computational methods, and STEM education.

Research Training Leadership and Mentoring

Research Mentoring Summary

- Mentored 9 Ph.D. graduates, more than 20 M.S. students, and numerous undergraduate researchers in artificial intelligence, machine learning, computational imaging, and applied mathematics.
- Developed an interdisciplinary research training environment integrating computer science, mathematics, engineering, biomedical imaging, and scientific computing.
- Graduated researchers have worked on AI methods for medical image analysis, disease characterization, cellular imaging, computer vision, sparse learning, deep learning, and computational modeling.
- Established research pathways connecting undergraduate research experiences, master's education, doctoral training, and externally funded interdisciplinary projects.

Postdoctoral Researchers

- Md Nasar Ibrahim — Research topic: Tissue Identification and Disease Characterization using Clinical Imaging.
- Duy Tang Hoang — Research topic: Tissue Identification and Quantification in Clinical Imaging.
- Keni Zheng — Research topic: Sparse Analysis and Machine Learning for Disease Characterization.
- Fatima Boukari — Research topic: Automated Cell Segmentation, Tracking, and Quantitative Analysis.

Ph.D. Researchers

- Lingling Liu — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Research topic: Tissue Identification and Characterization.
- Olaitan Oluwadare — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Automated Cell Segmentation, Tracking, and Quantification.
- Jian Zhao — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Research topic: Machine Learning Techniques for Cell Tracking.
- Chelsea E. Harris — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Joint Sparse Approximation and Deep Learning Techniques for AI-Assisted Disease Diagnosis (May 2025).
- Nagasoujanya Annasamudram — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Machine Learning and Computational Methods for Analysis of Multi-Dimensional Biomedical and Biological Images: From Macro to Micro Scale (December 2024).
- Azubuike Okorie — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Image Segmentation-Registration Cooperative Techniques Applied to Biomedicine and Remote Sensing (December 2022).
- Keni Zheng — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Integrative Sparse Modeling and Classification of Biomedical Imaging Patterns (December 2018).
- Stephen T. Johnson — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Exact

Topological Soliton Solutions of the Dispersive, Strongly Perturbed, and 2D Sine-Gordon Type Equations (December 2018).

- Fatima Boukari — Interdisciplinary Ph.D. in Mathematical Physics and Applied Mathematics. Dissertation: Mathematical Methods and Algorithms for Identification, Tracking, and Quantitative Analysis in Cellular Bioimaging (May 2017).

Master's Researchers

- Trey McVey — M.Sc. in Applied Mathematics (May 2026). Thesis: Automated Deep Learning Segmentation of Age-Related Tissue Changes in Thigh 2D and 3D Images.
- Lingling Liu — M.Sc. in Applied Mathematics (May 2025). Thesis: Machine Learning and Sparsity-Constrained Optimization in Medical Image Diagnosis.
- Uchenna Okorie — M.Sc. in Applied Mathematics (December 2023). Thesis: Principles and Techniques for Sparse Approximation-Based Diagnosis of Breast Cancer and Bone Disease.
- Onyekachi Williams — M.Sc. in Applied Mathematics (May 2022). Thesis: A Study of Automated Live Cell Tracking and Performance Evaluation.
- Yibing Wang — M.Sc. in Applied Mathematics (May 2022). Thesis: PDE-Based and Differential Analysis Methods for Automated Live Cell Segmentation.
- Taposh Biswas — M.Sc. in Applied Mathematics (May 2022). Thesis: Semantic Tissue Identification and Quantification in Radiological Imaging Using Multi-Atlas Segmentation.
- Chelsea Harris — M.Sc. in Applied Mathematics (December 2019). Thesis: Sparse Analysis and Dictionary Learning Techniques for Biomedical Image Classification.
- Taposh Bishwas — M.Sc. in Applied Optics (May 2018). Thesis: Graph Cut-Based Image Segmentation Using Statistical Priors and Its Application to Object Detection and Thigh CT Tissue Identification Analysis.
- Azubuike Okorie — M.Sc. in Applied Mathematics (May 2016). Thesis: Variational Image Segmentation and Application to Trabecular Tibia Identification.
- Shana Brown — M.Sc. in Applied Mathematics (May 2016). Thesis: Graph Theoretic Image Analysis Methods with Applications to Computer Vision and Biomedicine.
- Chao Zhang — M.Sc. in Applied Mathematics (May 2015). Thesis: Graph-Based Analysis in Computer Vision: Principles, Algorithms and Applications.

Undergraduate Researchers

- Brenda Tavera Resendiz (Capstone project, Spring 2025) — Topic: My Book Vault: A Multi-User Database for Tracking Reading Habits.
- Noah Klaus, Gavin McNatt, Trahmon Harris (Course project and PEMaCS Day presentation, Spring 2024) — Topic: Vector Spaces: Principles and Applications to Difference Equations.
- Raeshawn Joffrion (Capstone project, Spring 2023) — Topic: Data Science in Fashion Industry.
- Andrew Cronk (Capstone project, Spring 2022) — Topic: Using Binary Classifiers to Confirm Exoplanets from Kepler Objects of Interest Dataset.
- Kayla Morgan (Capstone project, Spring 2022) — Topic: A Study of COVID-19 Effect on Suicide Rates.
- Jared Lewis (Capstone project, Spring 2022) — Topic: Assessment of the Effect of E-learning on Students' Learning Process in Universities.
- Yu Bai (Fall 2018–Spring 2019) — Topic: Neural Networks for Disease Classification.
- Samuel Awidi (INBRE, Summer 2018) — Topic: Tissue Identification and Quantification Techniques for Body Composition Imaging.
- Rahul Patel (INBRE, Summer 2017) — Topic: Tissue Identification and Quantification Techniques for Body Composition Imaging; received 1st place for his poster in 2017 DSU Summer Symposium.
- Andrew B. Voshell (Capstone project, Spring 2017) — Topic: Optical Flow for Motion Detection.
- Jessica B. Patel (Capstone project, Spring 2017) — Topic: Optical Flow for Motion Detection.
- Ao Lan (Capstone project, Spring 2017) — Topic: Weighted Laplacian Differences Based Multispectral Anisotropic Diffusion.
- Yue Tai (Capstone project, Spring 2017) — Topic: Weighted Laplacian Differences Based Multispectral Anisotropic Diffusion.
- Zhongxu Ma (Capstone project, Spring 2017) — Topic: Weighted Laplacian Differences Based Multispectral Anisotropic Diffusion.
- Sammy Eyong (Capstone project, Spring 2017) — Topic: Active Contours (Snakes) and Level Sets.
- Victoria Elmidort (Capstone project, Spring 2017) — Topic: Active Contours (Snakes) and Level Sets.
- Deja Mack (Capstone project, Spring 2017) — Topic: Active Contours (Snakes) and Level Sets.
- Sammy Eyong (INBRE, Summer 2016) — Topic: Study and Comparison of Tissue Segmentation and Quantification Methods for Clinical Studies.

AI Education Leadership

I have developed and taught interdisciplinary courses spanning artificial intelligence, machine learning, computer vision, data science, computational mathematics, and scientific computing. My educational approach emphasizes the integration of mathematical foundations, algorithmic thinking, computational implementation, and real-world applications.

I have designed graduate and undergraduate learning experiences that prepare students to develop and apply AI methods in diverse domains, including biomedical imaging, engineering, scientific computing, and data-driven discovery. Through my courses, mentoring activities, and research supervision, I have trained students from mathematics, physics, engineering, and computing backgrounds to become independent computational researchers.

I have developed extensive instructional materials for graduate-level AI and computational science courses, including lecture notes, programming laboratories, and project-based learning activities. My teaching philosophy emphasizes inclusive mentoring, hands-on computational experience, and preparation of students for interdisciplinary AI research and industry applications.

Teaching Experience

- MTSC 887 Image Processing, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 852 Pattern Recognition, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 822 Scientific Computation II, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 821 Scientific Computation I, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 498 Topics in Math, PEMaCS Division, Delaware State University, Dover, DE.
- PHYS 442 Selected Topics in Physics II, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 341 Probability, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 340 Mathematical Methods in Data Science, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 319 Combinatorics, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 317 Number Theory, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 313 Linear Algebra, PEMaCS Division, Delaware State University, Dover, DE.
- ENGR 309 Electronic Circuit Analysis, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 252 Calculus II, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 251 Calculus I, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 241 Elementary Statistics, PEMaCS Division, Delaware State University, Dover, DE.
- MTSC 213/513 Discrete Math, PEMaCS Division, Delaware State University, Dover, DE.
- CS 722 Object Oriented Programming, Computer Science Department, Loyola University Maryland, Baltimore, MD, Fall 2010.
- ELE 1.6 Introduction to Programming, Electrical Engineering Technology Department, Technological Educational Institute of Western Greece (formerly Technological Educational Institute of Patras), Patras, Greece, Spring 2001.
- ELC 210 Electronic Measurements (laboratory classes), Physics Department, University of Patras, Patras, Greece, 1996–2000 (graduate teaching assistant).
- CLC 110 Introduction to Computer Science (laboratory classes), Physics Department, University of Patras, Patras, Greece, 1996–1997, 1998–1999 (graduate teaching assistant).

Selected Course Development Contributions

- Developed comprehensive graduate-level instructional materials for MTSC 887 Image Processing, including extensive lecture notes and computational laboratory exercises.
- Developed graduate-level materials for Pattern Recognition and Scientific Computation courses integrating mathematical foundations, machine learning algorithms, and programming applications.
- Contributed to development of interdisciplinary data science and computational mathematics curricula connecting mathematics, science, engineering, and artificial intelligence.

Awards and Distinctions

- **Best Oral Presentation Award**, senior author, First International Summit on Virtual Imaging Trials in Medicine (VITM 2024), Durham, North Carolina, April 2024.
- **IEEE ISBI Cell Tracking Challenge**, Live Cell Segmentation and Tracking team (DESU-US), participant in 2021, 2022, and 2023 challenges. Ranked top 3 in segmentation and tracking performances for one dataset (Fluo-C2DL-MSC) and top 10 for another dataset (Fluo-C2DL-GOWT1) among more than 55 teams. Results: Cell Tracking Challenge.
- **2012 Distinguished Achievement Award**, National Institute on Aging, NIH, recognizing exceptional work performance and high quality of research.

- **Most Cited Article 2006–2010**, Pattern Recognition journal, for "A Survey of Skin Color Modeling and Detection Methods."
- **Honorable Mention for Best Paper Award for 2007**, Pattern Recognition journal, for "A Survey of Skin Color Modeling and Detection Methods."
- Research work featured in the newsletter of the IEEE Systems, Man and Cybernetics Society, March 2005.
- Ph.D. thesis image segmentation algorithm included in the content-based image retrieval contest organized by the SCHEMA European Union multinational consortium. Results from the algorithm were denoted by WSRM(ELLAB).
- Visiting Scholarship, Vrije Universiteit Brussel, Brussels, Belgium, under the European Union SOCRATES/ERASMUS student mobility program, 09/2000–04/2001.
- Graduate Research Scholarship, General Secretariat of Research and Technology of Greece, grant 97ΥΠ46, "Color Image Segmentation Using Fuzzy Logic," 1997–2001.

Professional Activities

- Associate Editor, *Optics* (MDPI), February 2022–Present.
- Associate Editor, *Frontiers in Computer Science* (Computer Vision), October 2021–Present.
- Associate Editor, *Journal of Quantitative Imaging in Medicine and Surgery* (QIMS), AME Publishing Company, February 2020–Present.
- Associate Editor, *Journal of Biomedical Sciences Open Access*, August 2019–Present.
- Panel and ad-hoc reviewer for NIH, NSF, DoD, VA, and Delaware CTR grant proposals.
- Guest Editor, special issue "Biomedical and Biological Image Analysis Techniques for Cancer Detection, Diagnosis and Management," *Mathematical Biosciences and Engineering*, American Institute of Mathematical Sciences (AIMS).
- Guest Associate Editor, Computer Vision and Image Analysis, research topic "Computational, AI and Math Methods for Identification and Characterization of Biomedical Imaging Patterns," *Frontiers in Computer Science*, September 2019.
- Session Chair, "Statistical and Machine Learning Methods for Cancer Research II," International Symposium on Mathematical and Computational Oncology (ISMCO), 2021.
- Session Chair, "Computational Vision, AI and Mathematical Methods for Biomedical and Biological Image Analysis," 14th International Symposium on Visual Computing (ISVC 2019), Lake Tahoe, NV, October 7–9, 2019.
- International Program Committee, International Symposium on Mathematical and Computational Oncology (ISMCO'20), 2020–Present.
- International Program Committee, International Symposium on Visual Computing (ISVC), 2012–Present.
- Program Committee, International Conference on Information, Intelligence, Systems and Applications (IISA), 2013–2016.
- Chair, Applications I session, 11th International Symposium on Visual Computing (ISVC 2015), Las Vegas, NV, December 14–16, 2015.
- Associate Editor-in-Chief, *International Journal on Artificial Intelligence Tools*, World Scientific Publications, August 2010–2015.
- Chair, invited session "Intelligent Image Analysis," IEEE International Conference on Tools with Artificial Intelligence (ICTAI 2004), November 15–17, 2004, Washington, DC.
- Regular and ad-hoc reviewer for: *Nature Methods*; *Journal of Magnetic Resonance Imaging*; *Computers in Biology and Medicine*; *IEEE Transactions on Biomedical Engineering*; *IEEE Transactions on Computational Biology and Bioinformatics*; *IEEE Transactions on Cybernetics*; *IEEE Transactions on Signal Processing*; *Medical Image Analysis*; *IEEE Transactions on Medical Imaging*; *SPIE Journal of Electronic Imaging*; *IEEE Transactions on Geoscience and Remote Sensing*; *IEEE Transactions on Pattern Analysis and Machine Intelligence*; *Electronic Letters on Computer Vision and Image Analysis*; *IEEE Multimedia Magazine*; *Academic Radiology*; *Magnetic Resonance in Medicine*; IEEE DSP, ICTAI, and IGARSS conferences; IEEE IVR workshop; and other venues.

Professional Training & Development

- Participant, NIH-funded "Interactive Mentoring to Enhance Research Skills" (IMERS) grant-writing workshop, University of Kentucky, Louisville, October 12–14, 2022. Participants were selected following application review; acceptance rate was less than 20%.
- Teaching Certification Course, *Effective College Instruction*, Association of College and University Educators (ACUE), first DSU cohort, Spring and Summer 2019.

Service and Outreach

- **Departmental service:** personnel committee; graduate curriculum committee; undergraduate curriculum committee; scheduling committee; student committee; B.S. program coordinator.

- **College-level service:** assessment committee for ABET accreditation; hiring committee; STEM course integration committee; AtC coordinator.
- **University-level service:** DSU Faculty Senate; Business Analytics Program Committee.
- Judge, Kent County School District Science Fair.
- Judge, First Lego League Robotics Competition of the State of Delaware.

Invited Talks and Seminars

1. "Machine Learning-based Imaging Biomarkers for Metabolic and Age-related Diseases," RCMI-IHER Retreat, oral presentation, Lewes, Delaware, September 2023.
2. "Mathematical Imaging and Visual Computing: Principles and Applications," invited talk, College of Engineering, University of Delaware, CARS Distinguished Lecturer Seminar Series, Newark, DE, November 2021.
3. "Development of Imaging Biomarkers for Metabolic and Cardiovascular Dysfunctions," oral presentation, Junior Investigators Network Meeting, Delaware INBRE, September 2020.
4. "Feature-Based Image Registration with Applications to Remote Sensing and Medical Imaging," Joint Mathematics Meeting 2019, AMS Special Session on Statistical, Variational, and Learning Techniques in Image Analysis and Their Applications to Biomedical, Hyperspectral, and Other Imaging II, Baltimore, MD, 2019.
5. "Development and Validation of Automated Registration Techniques for Remotely Sensed Images," invited talk, 12th Annual Delaware Space Grant Research Symposium, Dover, DE, April 2018.
6. "Medical Image Analysis: Theory and Applications to Clinical Research," National Institute on Aging, National Institutes of Health, Baltimore, MD, April 2014.
7. "Medical Image Analysis: Theory and Applications to Clinical Research," Electronics and Computers Division, Physics Department, University of Patras, Greece, December 2012.
8. "Image Analysis Techniques in Medical Research and Clinical Practice," Electrical and Computer Engineering Department, University of Nevada, Reno, NV, March 2012.
9. "Automated Quantification of Muscle and Fat in the Thigh from Water-, Fat- and Non-Suppressed MR Images," National Institute on Aging Scientific Retreat 2010, Baltimore, MD, March 2010.
10. "The Anatomical Equivalence Class Formulation and its Application to Shape-based Computational Neuroanatomy," University of Patras, Patras, Greece, September 2007.
11. "Morphological Sub-space Decomposition for Computational Neuroanatomy," GlaxoSmithKline, King of Prussia, PA, May 2006.
12. "Brain Wave Analysis," Pre-College Forensics Program, Wright State University, Dayton, OH, July 2005.
13. "Segmentation and Grouping of Visual Information," Computing Science Department, University of Alberta, Edmonton, Alberta, Canada, July 2005.
14. "Segmentation and Grouping of Visual Information from One or Multiple Images," Computer Aided Diagnosis Laboratory, Department of Radiology, School of Medicine, University of Michigan, Ann Arbor, MI, June 2005.
15. "Dissimilarity Relations and Grouping Algorithms for Image and Motion Segmentation," Visual Computing Laboratory, Computer Science Department, University of Houston, Houston, TX, April 2005.
16. "Color Image Segmentation: Theory and Applications," Computer and Information Science Department, Brooklyn College, The City University of New York, New York, NY, January 2005.
17. "Brain Biometrics for Lie Detection," Pre-College Forensics Program, Wright State University, Dayton, OH, July 2004.
18. "An L-G & SPNG based Model for Brain Biometrics," IEEE ICTAI 2003 Conference, Sacramento, CA, October 2003.
19. "Fuzzy Segmentation and Compression of Color Images," Electronics and Information Retrieval Department, Vrije Universiteit Brussel, Brussels, Belgium, November 2000.

Memberships

- Member of the Institute of Electrical and Electronics Engineers (IEEE), International Society for Optical Engineering (SPIE), Society for Industrial and Applied Mathematics (SIAM), Sigma Xi, Phi Beta Delta, and Hellenic University Club of Philadelphia.

Technical Skills

- **Programming Languages:** Python, Java, C++, MATLAB, R, Perl, SQL, JavaScript.
- **Infrastructure / Systems:** Docker, AWS, GCP Cloud Run, Cloud Build, GitHub Actions, CI/CD, Linux, Vercel, Render.
- **AI / Machine Learning:** PyTorch, Hugging Face, LangChain, LangGraph, MONAI, Ollama, Scikit-learn, TensorFlow,

OpenAI APIs.

- **AI-Assisted Development:** Claude Code, GitHub Copilot, OpenAI Codex, Cursor, prompt-driven debugging, AI code review.