Georgios I. Orfanidis

Curriculum Vitae

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Research Interests

Machine learning, artificial intelligence, and signal processing; conducting research on team training and operation of wirelessly connected AI agents and single/few samples space and time-series inference in non-stationary environments.

Education

2021–present **Ph.D. Candidate, Computer Science**, *Florida Atlantic University*, Boca Raton, FL, USA.
Cumulative GPA: 4.0/4.0 | *Qualifying Exam:* 95/100 | *Expected Graduation* May 2026

2021–2023 **M.Sc., Artificial Intelligence**, *Florida Atlantic University*, Boca Raton, FL, USA.
Cumulative GPA: 4.0/4.0

2017–2021 **B.Sc., Computer Science with a minor in Mathematics**, *Winthrop University*, Rock Hill, SC, USA.
Cumulative GPA: 3.931/4.0 | *Computer Science GPA:* 3.948/4.0 | *Mathematics GPA:* 4.0/4.0

Publications

Peer-reviewed Conference papers

[1] **G. I. Orfanidis**, D. A. Pados, G. Sklivanitis, E. S. Bentley, Joseph Suprenant, and M. J. Medley, "Single-sample direction-of-arrival estimation by Hankel-matrix decompositions", in *Proc. 56th Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, Oct. 2022, pp. 1026-1030, doi: 10.1109/IEEECONF56349.2022.10051870.

[2] S. Mazokha, S. Naderi, **G. I. Orfanidis**, G. Sklivanitis, D. A. Pados, and J. O. Hallstrom, "Single-sample direction-of-arrival estimation for fast and robust 3D localization with real measurements from a massive MIMO system", in *Proc. IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, Rhodes Island, Greece, Jun. 2023, pp. 1-5, doi: 10.1109/ICASSP49357.2023.10096647.

[3] **G. I. Orfanidis**, D. A. Pados, and G. Sklivanitis, "Time-series analysis with small and faulty data: L1-norm decompositions of Hankel matrices", in *Proc. SPIE Defense + Commercial Sensing on Big Data IV: Learning, Analytics, and Applications*, Orlando, FL, April 2022, pp. 97-104, doi: 10.1117/12.2619243.

[4] **G. I. Orfanidis**, D. A. Pados, G. Sklivanitis, and E. S. Bentley, "A GPU (feed-forward neural network) implementation of SVD for rank enforcement in LoRA updates," in preparation.

Peer-reviewed Journal articles

[6] **G. I. Orfanidis**, D. A. Pados, G. Sklivanitis, and E. S. Bentley, "Single sample, small array, faulty measurements signal direction-of-arrival estimation," in preparation.

[7] **G. I. Orfanidis**, D. A. Pados, G. Sklivanitis, and E. S. Bentley, "Symmetry-preserving low-rank decompositions of arbitrary complex matrices," in preparation.

Research Experience

Florida Atlantic University, Center for Connected Autonomy and AI (CA-AI.fau.edu)

2024-present **Computational AI for functions optimization**.

To address optimization problems with no closed-form solution and ensure scalability for big-data applications, I use artificial neural network architectures to impose problem-specific constraints and "overfit" to fixed inputs, enabling efficient computation of extrema points on GPU fabric on the edge.

2022-present **Single-Sample Direction-of-Arrival Estimation Using L1-Norm and L2-Norm Hankel-Matrix Decompositions**.

To address the Direction-of-Arrival (DoA) problem in the era of networked autonomous robotic platforms, I draw from recent advancements in linear algebra and develop robust DoA estimators that operate effectively with a single antenna array data sample, a small number of antenna elements, and weak signals.

2021-present **Streaming Robust Time-Series Analysis: Edge AI L1-norm Decomposition of Hankel Matrices**.

Autonomous systems operating in highly non-stationary environments rely on analysis of short, sensed sequences that may be partly unreliable, have missing and faulty values. I develop model-free, statistics-free approaches for robust monitoring and tracking, for reliable performance in the presence of occasionally faulty measurements.

2021-2022 **Forecasting Floats in Turbulence (FFT) challenge by the Defense Advanced Research Projects Agency (DARPA)**.

A prize competition designed to promote the development of algorithms to predict the exact location of 90 free-drifting floats in the Atlantic Ocean. The proposed forecasting framework used only announced data points, utilized no assistance from any platforms (simulators, databases, etc.), and still ranked #26 out of many submissions from around the world.

Advisors: Prof. Dimitris A. Pados and Prof. George Sklivanitis.

Cornell University

2020-2021 **Fact Checking for Scientific Papers using Bidirectional Encoder Representations from Transformers (BERT)**.

Exploiting the LaTeX structure of papers from diverse disciplines available in the Cornell arXiv, I curated comprehensive datasets for the identification of inconsistencies in figure captions as well as for the identification of disparities in mathematical equations. Fine-tuning the BERT model with the task-specific datasets, I achieved 92% accuracy in identifying the aforementioned types of errors.

Advisor: Prof. Immanuel Trummer, *Assistant Professor, Department of Computer Science, Cornell University*.

North Carolina State University

2020-2021 **Effective Identification and Engagement of Transportation Stakeholders Using Geospatial Analytics and Online Advertising**.

The work was presented at the North Carolina Department of Transportation (NCDOT) Committee, the North Carolina Department of Transportation (NCDOT) Research & Innovation Summit, the North Carolina State University (NCSU) Internal Symposium and at the National Computer, and Information Science and Engineering (CISE) Symposium.

Advisor: Prof. Okan Pala, *Research Associate, Department of Computer Science & Center of Geo-spatial Analytics, North Carolina State University*.

Academic Distinctions

2024   **Best Ph.D. Research Poster Award**, *"One-shot Signal Direction-of-Arrival Estimation: Below Cramer-Rao Bound Performance''*.
Florida Atlantic University, College of Engineering & Computer Science

2024   **NSF Center For Smart Street Scapes (CS3) Site Visit, Poster Invitation**, *"One-shot Signal Direction-of-Arrival Estimation: Below Cramer-Rao Bound Performance''*.
Columbia University

2023-2024   **Academic Achievement Award**.
Florida Atlantic University

2022-2023   **Graduate Fellowship for Academic Excellence Award**.
Florida Atlantic University

2022-2023   **Wireless History Foundation Scholarhip**.
Wireless History Foundation (WHF)

2022-2023   **Research Contribution Award**.
Division of Research, Florida Atlantic University

2021-present   **Graduate Research Assistant Fellowship**.
Florida Atlantic University

2021   **Best Computer Science Graduate as selected by the faculty**.
Winthrop University

2018-2021   **Big South (NCAA Division 1 Athletic Conference) Presidential Academic Honor Award**.
Winthrop University

Academic Enrichment

2022   **NSF CyberTraining in Workforce Development for Future Smart Energy Systems**.

Students are exposed to key research areas related to the security and resilience in cyber-physical energy systems such as artificial intelligence, data analytics, communication, network security, IoT, real-time learning, multi-level decisions making, and smart grid applications.
Florida Atlantic University

2020   **Cornell, Maryland, Max Planck Pre-doctoral School 2020 (CMMRS 2020)**.

"The world's most qualified undergraduate and graduate students" were selected to participate in the program, become exposed to cutting-edge computer science research, and individually interact with leading scientists.(`https://cmmrs.mpi-sws.org/`).
Cornell University, University of Maryland, and Max Planck Institute for Software Systems

2020   **Queen City Hackathon**.

Developed and trained machine learning models to accurately forecast the economic growth or decline of a Charlotte, NC, USA area.
Analytics and Big Data Society (ABD Society)

2019   **Certification, Effective Problem-Solving and Decision-Making**.
University of Irvine

Professional Activities

2024   **Reviewer for 2024 IEEE Future Networks World Forum, Symposium on Spectrum Management in Future Networks**.

2023   **Reviewer for 2023 IEEE Asilomar Conference on Signals, Systems, and Computers**.

2021-present   **Graduate Student Member of the IEEE Signal Processing and Young Professionals Societies**.

2020-2021 **President of UPSILON PI EPSILON, the international honor society for the computing and information disciplines**.
Winthrop University

Projects

2023 **Vehicle Detection for Traffic Monitoring**.

Developed and implemented a real-time vehicle detection system using the YOLO deep learning algorithm aimed at improving traffic monitoring and public safety. The project focused on accurately detecting multiple vehicles in images and videos across diverse environmental conditions, ensuring robust performance in real-world scenarios such as varying lighting, weather, and traffic density conditions.

2022 **Image-based Target Tracking for UAV Self-Steering**.

Designed and implemented a convolutional neural network (CNN) for UAV target tracking based on image classification. The network was trained on a low-fidelity, synthetically generated dataset and tested on a high-fidelity, real-world dataset to assess its transfer learning capabilities without additional fine-tuning. Achieving an accuracy of 94.2%, the proposed CNN outperformed both the VGG-16 and a baseline perceptron model on the real-world dataset, demonstrating superior generalization performance across diverse environments.

2022 **Robot Navigation and Obstacle Avoidance**.

Implemented reinforcement learning algorithms including Monte Carlo methods, Dynamic Programming, Temporal Difference learning, traditional Q-learning, and Deep Q-learning, to enable robot navigation and obstacle avoidance in a simulated grid-world environment.

2022 **Ad Performance Optimization using User Click Data**.

Implemented the epsilon-greedy bandit algorithm to identify and promote the most engaging advertisement among ten options based on user click data.

2021 **Continental Ancestry Classification using Genetic Data**.

To classify individuals into five continental ancestries based on genetic data, I performed a regularized logistic multinomial regression fit by implementing from scratch ridge regression. Accelerated model training by projecting high-dimensional genetic data onto the top 10 principal components, reducing dimensionality while preserving key features. Compared the performance against an One-to-Rest SVM classifier.

2021 **Bank Customer Credit Card Balance Prediction**.

Performed a regularized least squares fit of a linear model by implementing from scratch Elastic Net regression. Optimized model performance by selecting tuning parameters via K-fold cross-validation, balancing the trade-off between regularization and feature selection.

Computer skills

Software Development: MATLAB, Python, R, JAVA, C, C++, HTML, PHP, Javascript, CSS, Git.
AI and Machine Learning: TensorFlow, Keras, Sklearn.
Database: SQL, MongoDB.

References

Prof. Dimitris A. Pados, *Schmidt Eminent Scholar Professor, Director of Center for Connected Autonomy and AI, Department of Electrical Engineering and Computer Science, Florida Atlantic University.*
✉ dpados@fau.edu

Prof. George Sklivanitis, *Schmidt Assistant Research Professor, Department of Electrical Engineering and Computer Science, Florida Atlantic University*
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