

Eftychios Protopapadakis

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Assistant Professor, Department of Applied Informatics, University of Macedonia.

Research fields: Machine Learning

1. Education

1.1 Postdoctoral Diploma | 2020 | National Technical University of Athens

- School of Rural & Surveying Engineering
- Thesis Title: Combinatory Semi-supervised Deep Learning Models for Decision Making.
- Research Field: Identification and understanding of image content (RGB, NIR, thermal) using deep learning and computer vision models, supplemented with semi-supervised learning techniques to efficiently initialize the models. Case studies involved semantic segmentation in color infrared orthophotos, such as building recognition, vegetation, and other areas, detecting different types of decay in the road network, and improving the topology of deep learning models using genetic algorithms in multi-criteria optimization problems.

1.2 PhD | 2016 | Technical University of Crete

- School of Production Engineering and Management
- Thesis Title: Decision Making via Semi-Supervised Machine Learning Techniques.
- Research Field: The research falls within the areas of machine learning, computer vision, topological optimization of neural networks, and decision making. Emphasis was placed on image content identification and understanding (RGB, thermal, hyperspectral) and signal analysis, utilizing unlabeled data. Applications included detecting falls in the elderly, digitizing cultural heritage, monitoring production lines in car factories, non-invasive defect detection in foundation beams, and content-based image retrieval.

1.3 Master of Science | 2011 | Technical University of Crete

- School of Production Engineering and Management, Master in Business Administration.
- Thesis Title: Using Genetic Algorithms and Neural Networks for Stock Price Trend Prediction.
- Research Field: Analysis of complex one-dimensional signals and their evolution using machine learning techniques, leveraging genetic algorithms for performance optimization.
- Course Grade: 9.25/10

1.4 Bachelor of Science in Production Engineering and Management | 2009 | Technical University of Crete

- School of Production Engineering and Management, 5-year program (integrated master).
- Thesis: Stock Price Trend Prediction during Financial Crisis Periods Using Neuro-Fuzzy Techniques.
- Research Field: Analysis of one-dimensional signal and its evolution during periods of extreme fluctuations.
- Degree Grade: 8.15/10

2 Working experience

1. National Technical University of Athens (January 2015 - August 2024)
 - Project Management / Project Manager
 - Main activities: Writing research proposals related to computer vision/graphics, image and signal processing in areas such as medical research, cultural heritage preservation (material and immaterial), and energy conservation.
2. Research Institute of Communication Systems and Computers (February 2014 - January 2023)
 - Main activities: Writing research proposals related to computer vision/graphics, image and signal processing in areas such as road safety, automatic surveillance (robotic platforms and UAVs), and life protection (evacuation of spaces, human detection in ruins).
3. Technical University of Crete (January 2012 - February 2017)
 - Main activities: Research in information management areas from thermal and optical (RGB) cameras for monitoring maritime areas and parking space management (violation detection).
4. RISA (March 2017 - June 2018)
 - Main activities: Research related to computer graphics / digitization of intangible cultural heritage (e.g., dances).
5. TELESTO (July 2018 - October 2019)
 - Main activities: Research on image/signal analysis from radar sensors.

Note: A detailed description is provided in sections (3 - teaching experience and 5 - participation in research programs).

3 Teaching experience

1. University of Macedonia
 - Spring Semester 2024: Taught courses on Neural Networks and Operations Research (pre-graduate), methods and tools in machine learning (post-graduate).
 - Fall Semester 2024: Taught courses on Machine Learning, Statistics, and Procedural Programming (pre-graduate), machine learning and computer vision (post-graduate).
 - Spring Semester 2023: Taught courses on Neural Networks and Operations Research (pre-graduate), Bayesian optimization (post-graduate).
 - Fall Semester 2023: Taught courses on Machine Learning (pre-graduate), machine learning and natural language processing (post-graduate).
2. University of West Attica
 - Spring Semester 2022: Computer vision (pre-graduate)
 - Fall Semester 2022: Image processing (pre-graduate)
 - Spring Semester 2021: Computer vision (pre-graduate)
 - Fall Semester 2021: Image processing (pre-graduate)
 - Spring Semester 2020: Computer vision (pre-graduate)
 - Fall Semester 2020: Image processing (pre-graduate)
 - Spring Semester 2019: Artificial Intelligence and Intelligent Multimedia Systems (laboratory course, pre-graduate).
3. Technical University of Crete
 - Fall Semester 2017: Laboratory course on Artificial Intelligence.

4 Awards / Distinctions

1. 2024: Stanford - Elsevier's Top 2% Scientist Rankings
2. 2017-2019: IKY Fellowships under the "Enhancement of Postdoctoral Researchers (1st Cycle)" program.
3. 2012-2016: State scholarships foundation, Excellence Scholarships for postgraduate studies in Greece - Siemens program.

4. 2012: Best conference paper (Infocomp) by Eftychios E. Protopapadakis, Anastasios D. Doulamis, Konstantinos Makantasis, Athanasios S. Voulodimos, titled "A Semi-supervised Approach for Industrial Workflow Recognition," presented at The Second International Conference on Advanced Communications and Computation.
5. 2012: Honorary distinction, Technical Chamber of Greece.
6. 2011: Special Account for Research Funding Scholarship, Technical University of Crete.
7. 2008: Special Account for Research Funding Scholarship, Technical University of Crete.
8. 2007: Special Account for Research Funding Scholarship, Technical University of Crete.
9. 2006: Special Account for Research Funding Scholarship, Technical University of Crete.

5 Research activity

The research activity involves 14 European programs (proposal preparation, research activities, systems deployment. management/coordination), 2 Intereg cross-border programs (management, research work), and 4 programs, funded by the General Secretariat for Research and Innovation, in Greece.

5.1 European funded projects (Horizon) [some indicative cases]

1. Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens: the euPOLIS Approach

Duration: 2020-2024, Category: H2020-EU.3.5.2. Protection of the environment, sustainable management of natural resources, water, biodiversity and ecosystems

2. PHOOTONICS: A Cost-Effective Photonics-based Device for Early Prediction, Monitoring and Management of Diabetic Foot Ulcers

Duration: 2019-2023, Category: H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)

3. PANOPTIS: Development of a Decision Support System for increasing the Resilience of Transportation Infrastructure based on combined use of terrestrial and airborne sensors and advanced modeling tools

Duration: 2018-2021, Category: H2020-EU.3.4. - SOCIETAL CHALLENGES - Smart, Green And Integrated Transport

4. BENEFFICE: Energy Behaviour Change driven by plug-and-play-and-forget ICT and Business Models focusing on complementary currency for Energy Efficiency for the Wider Population

Duration: 2017-2020, Category: H2020-EU.3.3.1. - Reducing energy consumption and carbon footprint by smart and sustainable use

5. RANGER: RADars for loNG distance maritime surveillancE and SaR opeRations

Duration: 2016-2019, Category: H2020-EU.3.7. - Secure societies - Protecting freedom and security of Europe and its citizens

6. 4D-CH-WORLD: Four Dimensional Cultural Heritage World

Duration: 2013-2017, Category: FP7-PEOPLE - Specific programme "People" implementing the Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007 to 2013)

7. ROBO-SPECT: ROBotic System with Intelligent Vision and Control for Tunnel Structural INSPECTIon and Evaluation

Duration: 2013-2016, Category: FP7-ICT - Specific Programme "Cooperation": Information and communication technologies

8. Terpsichore: Transforming Intangible Folkloric Performing Arts into Tangible Choreographic Digital Objects

Duration: 2016-2019, Category: H2020-EU.1.3.3. - Stimulating innovation by means of cross-fertilization of knowledge

5.2 European funded projects (Interreg)

1. e-ParkH: Leveraging cutting-edge technologies for user payment and management of public parking

Duration: 2011-2013, Category: Interreg Greece - Cyprus2007-2013

2. Poseidon: deployment of an intelligent maritime surveillance system based on RGB sensors

Duration: 2011-2013, Category: Interreg Greece - Cyprus2007-2013

6 Journal Reviewer

1. Algorithms (MDPI)
2. Automation in Construction (Elsevier)
3. Computational Intelligence and Neuroscience (Hindawi)
4. Computers (MDPI)
5. Electronics (MDPI)
6. Entertainment Computing (Elsevier)
7. Entropy (MDPI)
8. Information Fusion (Elsevier)
9. Journal of Imaging (MDPI)
10. Measurement (Elsevier)
11. Open Journal of Signal Processing (IEEE)
12. Remote Sensing (MDPI)
13. Sensors (MDPI)
14. Symmetry (MDPI)
15. Transactions on Geoscience and Remote Sensing (IEEE)
16. Transactions on Smart Grid (IEEE)

7 TPC member

1. [CoG] 3rd IEEE Conference on Games, 21-24 August, 2022, CASIA, Beijing, China (virtual)
2. 2nd International Conference TMM-CH, Transdisciplinary Multispectral Modelling and Cooperation for the Preservation of Cultural Heritage Rebranding the World in Crisis through Culture, 12-15 December 2021 Eugenides Foundation Athens, Greece
3. [ACII 2021] 9th International Conference on Affective Computing & Intelligent Interaction, 28 September – 1 October, 2021, Virtual Event
4. [NIDS] 1st international conference on novelties in intelligent digital systems, 30 September – 1 October 2021, Athens, Greece (Virtual)
5. [CoG] 3rd IEEE Conference on Games, 17–20 August, 2021 IT University of Copenhagen (Virtual)
6. [PCI] 24th Pan-Hellenic Conference on Informatics, 2020, Athens, Greece
7. [CoG] IEEE Conference on Games, 2020, Kindai University, Osaka, Japan

8. [VS-Games] 9th International Conference on Virtual Worlds and Games for Serious Applications, 2017, Athens, Greece
9. ACM Pervasive Intelligence in Engineering Workshop in conjunction with ACM Pervasive Technologies Related to Assitive Environments (PETRA), 2017, Rhodes, Greece.
10. 4th IEEE ARTEMIS International Workshop on Analysis and Retrieval of Tracked Events and Motion in Imagery Streams”, 2013, Barcelona, Spain

8 Publications (Journals)

- [1] Kavouras, I., Sardis, E., Protopapadakis, E., Rallis, I., Doulamis, A., & Doulamis, N. (2023). A Low-Cost Gamified Urban Planning Methodology Enhanced with Co-Creation and Participatory Approaches. *Sustainability*, 15(3), Article 3. <https://doi.org/10.3390/su15032297>
- [2] Kopsiaftis, G., Kaselimi, M., Protopapadakis, E., Voulodimos, A., Doulamis, A., Doulamis, N., & Mantoglou, A. (2023). Performance comparison of physics-based and machine learning assisted multi-fidelity methods for the management of coastal aquifer systems. *Frontiers in Water*, 5. <https://www.frontiersin.org/articles/10.3389/frwa.2023.1195029>
- [3] Kaselimi, M., Protopapadakis, E., Voulodimos, A., Doulamis, N., & Doulamis, A. (2022). Towards Trustworthy Energy Disaggregation: A Review of Challenges, Methods, and Perspectives for Non-Intrusive Load Monitoring. *Sensors*, 22(15), Article 15. <https://doi.org/10.3390/s22155872>
- [4] Katsamenis, I., Doulamis, N., Doulamis, A., Protopapadakis, E., & Voulodimos, A. (2022). Simultaneous Precise Localization and Classification of metal rust defects for robotic-driven maintenance and prefabrication using residual attention U-Net. *Automation in Construction*, 137, 104182. <https://doi.org/10.1016/j.autcon.2022.104182>
- [5] Kavouras, I., Kaselimi, M., Protopapadakis, E., Bakalos, N., Doulamis, N., & Doulamis, A. (2022). COVID-19 Spatio-Temporal Evolution Using Deep Learning at a European Level. *Sensors*, 22(10), Article 10. <https://doi.org/10.3390/s22103658>
- [6] Kioussi, A., Karoglou, M., Protopapadakis, E., Doulamis, A., Ksinopoulou, E., Bakolas, A., & Moropoulou, A. (2021). A computationally assisted cultural heritage conservation method. *Journal of Cultural Heritage*, 48, 119–128. <https://doi.org/10.1016/j.culher.2020.12.001>
- [7] Klothakis, A., Quintanilha, H., Sawant, S. S., Protopapadakis, E., Theofilis, V., & Levin, D. A. (2022). Linear stability analysis of hypersonic boundary layers computed by a kinetic approach: A semi-infinite flat

- plate at $\|\mathbf{v}\| \leq \epsilon$. *Theoretical and Computational Fluid Dynamics*, 36(1), 117–139. <https://doi.org/10.1007/s00162-021-00601-y>
- [8] Kaselimi, M., Doulamis, N., Voulodimos, A., Doulamis, A., & Protopapadakis, E. (2021). EnerGAN++: A Generative Adversarial Gated Recurrent Network for Robust Energy Disaggregation. *IEEE Open Journal of Signal Processing*, 2, 1–16. <https://doi.org/10.1109/OJSP.2020.3045829>
- [9] Protopapadakis, E., Doulamis, A., Doulamis, N., & Maltezos, E. (2021). Stacked Autoencoders Driven by Semi-Supervised Learning for Building Extraction from near Infrared Remote Sensing Imagery. *Remote Sensing*, 13(3), Article 3. <https://doi.org/10.3390/rs13030371>
- [10] Voulodimos, A., Protopapadakis, E., Katsamenis, I., Doulamis, A., & Doulamis, N. (2021). A Few-Shot U-Net Deep Learning Model for COVID-19 Infected Area Segmentation in CT Images. *Sensors*, 21(6), Article 6. <https://doi.org/10.3390/s21062215>
- [11] Doulamis, A., Voulodimos, A., Protopapadakis, E., Doulamis, N., & Makantasis, K. (2020). Automatic 3D Modeling and Reconstruction of Cultural Heritage Sites from Twitter Images. *Sustainability*, 12(10), Article 10. <https://doi.org/10.3390/su12104223>
- [12] Voulodimos, A., Protopapadakis, E., Katsamenis, I., Doulamis, A., & Doulamis, N. (2020). Deep learning models for COVID-19 infected area segmentation in CT images. *medRxiv*, 2020.05.08.20094664. <https://doi.org/10.1101/2020.05.08.20094664>
- [13] Kaselimi, M., Doulamis, N., Voulodimos, A., Protopapadakis, E., & Doulamis, A. (2020). Context Aware Energy Disaggregation using Adaptive Bidirectional LSTM Models. *IEEE Transactions on Smart Grid*, 1–1. <https://doi.org/10.1109/TSG.2020.2974347>
- [14] Protopapadakis, E., Rallis, I., Doulamis, A., Doulamis, N., & Voulodimos, A. (2020). Unsupervised 3D Motion Summarization Using Stacked Auto-Encoders. *Applied Sciences*, 10(22), Article 22. <https://doi.org/10.3390/app10228226>
- [15] Kaselimi, M., Protopapadakis, E., Voulodimos, A., Doulamis, N., & Doulamis, A. (2019). Multi-Channel Recurrent Convolutional Neural Networks for Energy Disaggregation. *IEEE Access*, 7, 81047–81056. <https://doi.org/10.1109/ACCESS.2019.2923742>

- [16] Kopsiaftis, G., Protopapadakis, E., Voulodimos, A., Doulamis, N., & Mantoglou, A. (2019). Gaussian Process Regression Tuned by Bayesian Optimization for Seawater Intrusion Prediction. *Computational Intelligence and Neuroscience*. <https://doi.org/10.1155/2019/2859429>
- [17] Protopapadakis, E., Niklis, D., Doumpos, M., Doulamis, A., & Zopounidis, C. (2019). Sample selection algorithms for credit risk modelling through data mining techniques. *Int. J. Data Mining, Modelling and Management*, 11(2), 103–128. <https://doi.org/10.1504/IJDMMM.2019.10019369>
- [18] Protopapadakis, E., Voulodimos, A., & Doulamis, A. (2018). On the Impact of Labeled Sample Selection in Semisupervised Learning for Complex Visual Recognition Tasks. *Complexity*. <https://doi.org/10.1155/2018/6531203>
- [19] Loupos, K., Doulamis, A. D., Stentoumis, C., Protopapadakis, E., Makantasis, K., Doulamis, N. D., Amditis, A., Chrobocinski, P., Victores, J., & Montero, R. (2018). Autonomous robotic system for tunnel structural inspection and assessment. *International Journal of Intelligent Robotics and Applications*, 2(1), 43–66.
- [20] Protopapadakis, E., Voulodimos, A., Doulamis, A., Doulamis, N., & Stathaki, T. (2019). Automatic crack detection for tunnel inspection using deep learning and heuristic image post-processing. *Applied Intelligence*. <https://doi.org/10.1007/s10489-018-01396-y>
- [21] Rallis, I., Protopapadakis, E., Voulodimos, A., Doulamis, N., Doulamis, A., & Bardis, G. (2019). Choreographic Pattern Analysis from Heterogeneous Motion Capture Systems Using Dynamic Time Warping. *Technologies*, 7(3), 56. <https://doi.org/10.3390/technologies7030056>
- [22] Protopapadakis, E., Voulodimos, A., Doulamis, A., Camarinopoulos, S., Doulamis, N., & Miaoulis, G. (2018). Dance Pose Identification from Motion Capture Data: A Comparison of Classifiers. *Technologies*, 6(1), Article 1. <https://doi.org/10.3390/technologies6010031>
- [23] Voulodimos, A., Doulamis, N., Doulamis, A., & Protopapadakis, E. (2018). Deep learning for computer vision: A brief review. *Computational Intelligence and Neuroscience*, 2018.
- [24] Protopapadakis, E., Schauer, M., Pierri, E., Doulamis, A. D., Stavroulakis, G. E., Böhrnsen, J.-U., & Langer, S. (2016). A genetically optimized neural classifier applied to numerical pile integrity tests considering concrete piles. *Computers & Structures*, 162, 68–79.

- [25] Protopapadakis, E., Voulodimos, A., Doulamis, A., Doulamis, N., Dres, D., & Bimpas, M. (2017). Stacked autoencoders for outlier detection in over-the-horizon radar signals. *Computational Intelligence and Neuroscience*, 2017.
- [26] Atsalakis, G. S., Protopapadakis, E. E., & Valavanis, K. P. (2016). Stock trend forecasting in turbulent market periods using neuro-fuzzy systems. *Operational Research*, 16(2), 245–269.
- [27] Makantasis, K., Protopapadakis, E., Doulamis, A., Doulamis, N., & Matsatsinis, N. (2016). 3D measures exploitation for a monocular semi-supervised fall detection system. *Multimedia Tools and Applications*, 75(22), 15017–15049.
- [28] Makantasis, K., Protopapadakis, E., Doulamis, A., & Matsatsinis, N. (2016). Semi-supervised vision-based maritime surveillance system using fused visual attention maps. *Multimedia Tools and Applications*, 75(22), 15051–15078.
- [29] Protopapadakis, E., & Doulamis, A. (2014). Semi-supervised image meta-filtering using relevance feedback in cultural heritage applications. *International Journal of Heritage in the Digital Era*, 3(4), 613–627.
- [30] Hadjiprocopis, A., Wenzel, K., Rothermel, M., Ioannides, M., Fritsch, D., Klein, M., Johnsons, P. S., Weinlinger, G., Doulamis, A., & Protopapadakis, E. (2014). *Cloud-based 3D Reconstruction of Cultural Heritage Monuments using Open Access Image Repositories*.

9 Documents and citations' trends

Google Scholar (22 April 2024). Citations: 5961, h-index:30, i10-index:54. Citations (for 2024): 471.

Scopus (22 April 2024). Citations: 3893, h-index:24