Charilaos Mylonas, Ph.D.

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About

I am a data science and scientific computing expert, with a strong mathematical and high performance computing background, and more than 7 years of machine learning / deep learning experience. I hold a Ph.D. on Machine Learning for Structural Health Monitoring, with original contributions on the use of deep learning and generative ML in predictive maintenance. My overall organizational impact, during both my academic tenure and within Deloitte, is in fostering maintainable and modular software engineering practices, solid DevOps practices, and an inclusive culture of collaboration, and continuous learning.

Work Experience

Sept 2024–current	**Deloitte** Assistant Manager
	· Developed a data-driven methodology for improving the effectiveness of compliance monitoring using machine learning.
	· Contributed to successful business development activities on AI in energy trading, as a subject matter expert on AI and trading.
Feb 2022–Sept 2024	**Deloitte** Senior Consultant
	· Designed and created GenAI prototypes with retrieval augmented generation.
	· Developed machine learning techniques for money laundering risk estimation.
	· Implemented and benchmarked a deep learning-based in-house diarization (speech processing) system for the compliance department of a large swiss bank.
	· Gained hands-on experience in financial risk management (low-default portfolios default risk estimation, portfolio theory, liquidity and leverage regulatory reporting).
	· Facilitated communication with client stakeholders of varied seniority in a critical and dynamically evolving project, as part of the financial risk reporting team during the merger of two global systemically important banks. Introduced software project management practices for automation code, which improved accountability, ownership, code maintainability. This resulted in early delivery and persistent increases in efficiency for regulatory reporting.
Sept 2016–Nov 2021	**ETH Zurich** Ph.D. Candidate/Research Assistant
	· Researched scalable probabilistic machine learning for structural condition monitoring of wind turbines and wind farms (Python, TensorFlow).
	· Implemented a message-passing GNN library (`https://github.com/mylonasc/tf-gnns/`).
	· Engaged in industrial collaborations (raw data curation, deep learning for remaining useful life prediction, wind farm data processing).
	· Awarded Ph.D. with no corrections on first submission, and nominated unanimously from examination panel for the ETH Medal.
Dec 2015–Sept 2016	**ETH Zurich** Research Assistant
	· Implemented advanced statistical learning algorithms (high-dimensional regression with tensor decompositions), including original automated model selection pipelines (Matlab).
	· Implemented and tested uncertainty quantification algorithms.
	· Developed a web interface to sensitivity and regression analysis (PHP, JavaScript, Matlab).
Jul 2014–Dec 2014	**Credit Suisse** Full-Stack Trading Tool Developer (internship)
	· Implemented and validated a high level interface for an option pricer (C++, R).
	· Implemented a RESTful timeseries server and a scriptable front-end visualization trading signal identification tool (Python, JavaScript, MySQL).

Education

SEPT 2016 – SEPT 2021	**ETH Zurich** Ph.D. in MACHINE LEARNING FOR STRUCTURAL HEALTH MONITORING UNDER UNCERTAINTY Advisor: Prof. Eleni Chatzi
SEPT 2012 – SEPT 2015	**ETH Zurich** M.Sc. in COMPUTATIONAL SCIENCE AND ENGINEERING Specialization: Computational Electromagnetics Advisor: Prof. Ralf Hiptmair

Technical Strengths

Programming Languages	Python, Matlab, R C++, Java, JavaScript	●●●●●● ●●●●○○
Other software development skills	Linux, Docker, Kubernetes, Classical ML Algorithms, Scientific Computing, Software Design, Web Development, High Performance Computing, Retrieval Augmented Generation systems, Microcontroller Programming	
Deep Learning	Probabilistic Generative Models (GANs, VAEs, Normalizing Flows, Denoising Diffusion models), Graph Neural Networks, Strong familiarity of all core Deep Learning architectures (gated RNNs, CNNs, Attention Mechanisms & Transformers) and how they apply to different data modalities (text, audio, images, tabular data).	

Other Information

Teaching assistant roles

· High Performance Computing for CSE (C++, OpenMP) (2020) (Prof. O. Schenk).
· Method of Finite Elements (Matlab, Python) (2017 – 2019) (Prof. E. Chatzi).

Other academic engagements

· *Mentorship*: Serving as mentor for Ph.D. students at ETH Zurich (upon invitation).
· *Student project supervision*: 6 MSc theses and semester projects and consulted on several others.
· *Reviewer assignments*: for Mechanical Systems and Signal Processing and Journal of Sound and Vibration.

Distinctions and certificates

· **Best paper award** in 39th IMAC conference (Feb. 2021).
· **SIAM Gene Golub Scholarship** for Ph.D. summer school on "*High-Performance Data Analytics*" *Aussois, France 2019.*

Selected Publications

Please refer to Google Scholar [link] for full list and updated citation count.

***Mylonas, C.** (ETH Ph.D. Dissertation)* Machine Learning for Structural Health Assessment under Uncertainty, with applications in Wind Energy, [link]

***Mylonas C**, Chatzi E.* Remaining Useful Life Estimation for Engineered Systems Operating under Uncertainty with Causal GraphNets. Sensors. 2021; 21(19):6325. https://doi.org/10.3390/s21196325

***Mylonas, C.**, Abdallah, I., Chatzi, E.* Conditional variational autoencoders for probabilistic wind turbine blade fatigue estimation using SCADA data. Wind Energy. 2021; 1- 18. https://doi.org/10.1002/we.2621

*Lai, Z., **Mylonas, C.**, Nagarajaiah, S., & Chatzi, E.* Structural identification with physics-informed neural ordinary differential equations. Journal of Sound and Vibration, 508, 116196.

***Mylonas, C.**, Abdallah, I., Chatzi, E.* (2021) Relational VAE: A Continuous Latent Variable Model for Graph Structured Data [link]

***Mylonas, C.**, Tsialiamanis, G., Worden, K. & Chatzi, E.* Bayesian graph neural networks for strain-based crack localization. (*39th IMAC conference proc.*) [link]

***Mylonas, C.**, Abdallah, I., & Chatzi, E. (2020).* Deep Unsupervised Learning For Condition Monitoring and Prediction of High Dimensional Data with Application on Windfarm SCADA Data. *In Model Validation and Uncertainty Quantification, Volume 3 (pp. 189-196). Springer, Cham.*