

# Manuel MADEIRA

## PERSONAL DATA

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## ABOUT ME

I am a 4th-year PhD student at EPFL under the supervision of [Pascal Frossard](#) and [Dorina Thanou](#). My interests gravitate around generative modelling, graph deep learning and their applications in enabling scientific discoveries. I have proposed novel generative frameworks for graphs and developed methods that incorporate domain knowledge to enhance the controllability and performance of graph generation. Recently, I have also begun exploring vision and language foundational models in the context of digital pathology.

## EDUCATION

2022 - PRESENT	PhD. in MACHINE LEARNING (Expected Graduation: December 2026) <b>École Polytechnique Fédérale de Lausanne</b> , Switzerland
2018 - 2019 (FALL)	Exchange student in COMPUTER SCIENCE <b>Tsinghua University</b> , China
2018 - 2021	MSc. in BIOMEDICAL ENGINEERING <b>Instituto Superior Técnico</b> , Portugal GPA: 19 / 20 ( <b>1st</b> in class), THESIS: 20/20
2015 - 2018	BSc. in BIOMEDICAL ENGINEERING <b>Instituto Superior Técnico</b> , Portugal GPA: 19 / 20 ( <b>1st</b> in class and <b>1st</b> ever to attain such grade)

## RESEARCH EXPERIENCE

JUL 2025 - DEC 2025	<b>Applied Scientist Intern</b> at AMAZON Developed a graph-based deep learning framework for predictive modeling in supply chain long-term planning.
SEP 2022 - PRESENT	<b>Doctoral Assistant</b> at EPFL Studied the incorporation of structural constraints into graph discrete diffusion models and developed the first discrete flow matching model for graphs. Employed these methods in real-world applications, including molecular generation and digital pathology.
SEP 2021 - AUG 2022	<b>Machine Learning Researcher</b> at <a href="#">INDUCTIVA RESEARCH LABS</a> Conducted research on deep learning based approaches to solve partial differential equations. Deployed physics-informed neural networks to model heat diffusion and coastal dynamics and analysed their generalization to arbitrary domains.
MAR 2021 - JUN 2021	<b>Research Internship</b> at <a href="#">INSTITUTE FOR SYSTEMS AND ROBOTICS</a> SUPERVISORS: <a href="#">Renato Negrinho</a> , <a href="#">João Xavier</a> , and <a href="#">Pedro Aguiar</a> Researched on $L$ -smoothness exploitation for first-order stochastic optimization methods with theoretical developments on algorithmic analysis.
SEP 2019 - FEB 2020	<b>Research Internship</b> at <a href="#">IST-ID</a> Transcribed interviews on health technologies assessment in Portugal for the <a href="#">MEDI-VALUE PROJECT</a> .

## AWARDS AND HONORS

2025	<b>Top Reviewer</b> , by NeurIPS 2025
2025	<b>Innovation Fellowship Finalist</b> , by Qualcomm
2022-23	<b>EDIC PhD Fellowship</b> , by EPFL
2016-18	<b>1st ranked student in Biomedical Engineering BSc</b> , by Instituto Superior Técnico
2015-20	<b>Diploma of Academic Excellence (Top 10%)</b> , by Instituto Superior Técnico
2009-15	<b>Best student in high school</b> , by Crédito Agrícola

## PUBLICATIONS

- [1] A. Carballo-Castro, MM, Y. Qin, D. Thanou, and P. Frossard. **Generating Directed Graphs with Dual Attention and Asymmetric Encoding**. In: ArXiv. 2025.
- [2] S. Ögüt, C. Vincent-Cuaz, MM, et al. **Benchmarking Instance-Level Learnability and Interpretability in Multiple Instance Learning**. In: Under Review. 2025.
- [3] B. Chen<sup>\*</sup>, C. Vincent-Cuaz<sup>\*</sup>, L. A. Schoenpflug<sup>\*</sup>, MM<sup>\*</sup>, et al. **Revisiting Automatic Data Curation for Vision Foundation Models in Digital Pathology**. In: Early Acceptance (Top 9%). MICCAI. 2025.
- [4] O. Zaghen, MM, L. Toni, and P. Frossard. **Graph Discrete Diffusion: a Spectral Study**. In: *DeLTa and XAI4Science Workshops*. ICLR. 2025.
- [5] L. Sbicego, S. Ögüt, MM, Y. Qin, D. Thanou, and P. Frossard. **On the Role of Graph Structure in Graph Neural Networks**. In: *ICBINB Workshop*. Selected for PMLR Proceedings. ICLR. 2025.
- [6] Y. Qin<sup>\*</sup>, MM<sup>\*</sup>, D. Thanou, and P. Frossard. **DeFoG: Discrete Flow Matching for Graph Generation**. In: Oral Presentation (Top 1%). ICML. 2024.
- [7] MM, C. Vignac, D. Thanou, and P. Frossard. **Generative Modelling of Structurally Constrained Graphs**. In: NeurIPS. 2024.
- [8] MM, D. Thanou, and P. Frossard. **Tertiary Lymphoid Structures Generation through Graph-based Diffusion**. In: *GRAIL Workshop*. MICCAI. 2023.
- [9] S. Moalla<sup>\*</sup>, MM<sup>\*</sup>, L. Riccio<sup>\*</sup>, and J. Lee<sup>\*</sup>. **[Re] Reproducibility Study of Behavior Transformers**. In: *ML Reproducibility Challenge 2022*. Outstanding Paper Award (Honorable Mention). ReScience C. 2023.
- [10] MM, R. Negrinho, J. Xavier, and P. M. Aguiar. **COCO Denoiser: Using Co-Coercivity for Variance Reduction in Stochastic Convex Optimization**. In: *OPT Workshop*. NeurIPS. 2021.

## TALKS

**NeurIPS 2025**, Vancouver, Canada, 2025. *DeFoG: Discrete Flow Matching for Graph Generation*.

**AI Alliance: AI in Materials & Chemistry Webinar Series**, [online](#). *DeFoG: Discrete Flow Matching for Graph Generation*.

**Inductiva Machine Learning for Science & Engineering Summer School**, Porto, Portugal, 2025. *An Introduction to Graph Neural Networks*.

**BioML Workshop**, Lausanne, Switzerland, 2025. *Constrained Graph Generative Models in Science*.

**Applied Machine Learning Days**, Lausanne, Switzerland, 2025. *Constrained Graph Generative Models in Science*.

**DataMakers Fest**, Porto, Portugal, 2023. *Generative Models in Science: A Peek into Graph Diffusion Models for Digital Pathology*.

## TEACHING EXPERIENCE

Teaching Assistant for:

- Network Machine Learning (Lead TA in 2024/2025)
- Probability and Statistics
- Practice of Object-Oriented Programming
- Analysis I
- Histology

Supervised 4 students.

## SOFTWARE SKILLS

LANGUAGES: Python, Matlab, Java, Mathematica, R  
FRAMEWORKS: PyTorch, Keras, Tensorflow, Pandas, Scikit-learn, NumPy, CVX, CVXPY/CVXOPT, Abaqus  
MISC: Unix, Git, Docker, Kubernetes, SLURM, Run:AI

## EXTRACURRICULAR ACTIVITIES

- 2023 Attended Cambridge Ellis Unit Summer School on Probabilistic Machine Learning
- 2022 - PRESENT Co-organizer of [Deep Learning Sessiong Portugal](#)
- 2021 Attended Lisbon Machine Learning Summer School
- 2009-21 Competitive football player (national level)
- 2015 National finalist in Biology Olympiad

## LANGUAGES

PORTUGUESE: Native  
ENGLISH: C2, TOEFL iBT: 114 / 120  
SPANISH: A2  
FRENCH: A2  
CHINESE: Elementary (Tsinghua course)

## PERSONAL INTERESTS

Football, CrossFit, Ski, Reading, Cinema

## COMMUNITY SERVICE

Reviewer for NeurIPS, NPGML workshop (NeurIPS) and ComBayNS workshop (IJCNN)