Nelson Aloysio Reis de Almeida Passos

Postdoctoral Researcher · High Performance Computing Laboratory, CNR-ISTI

Pisa, Italy | nelsonaloysio.reis@isti.cnr.it | nelsonaloysio.github.io

0000-0003-1869-2976 | Google Scholar | LinkedIn

EDUCATION

2022 – 2026 **Ph.D. in Artificial Intelligence**, University of Pisa, Italy.
Funding: National Research Council (CNR), Italy.

2019 – 2022 **M.Sc. in Social Sciences**, Federal University of Espírito Santo, Vitória, Brazil.
Funding: CAPES, Ministry of Education, Brazil.

2018 – 2021 **Pg.Dip. in Data Science with Big Data**, Federal Institute of Espírito Santo, Serra, Brazil.

2011 – 2018 **B.Sc. in Social Communication**, Federal University of Espírito Santo, Vitória, Brazil.

Theses

2026 Efficient Neural Community Detection on Time-Varying Attributed Graphs.
Doctoral thesis, University of Pisa. *Supervisors: Dr. Emanuele Carlini, Dr. Salvatore Trani*.
Assessment: 'Excellent'. Doctor Europaeus certification.

2022 Classifying communities in temporal networks by text: mapping the 2013–2018 Brazilian protests on Twitter.
Master's thesis, Federal University of Espírito Santo. *Supervisor: Prof. Cristiana Losekann*.
In Portuguese.

2020 Cluster analysis using the Markov Cluster Algorithm and the Louvain method: a case study of Wikipedia entries.
Postgraduate specialization thesis, Federal Institute of Espírito Santo. *Supervisor: Prof. Jefferson Andrade*. In Portuguese.

2018 A tool for data journalism, social network analysis and cyberspace mapping.
Bachelor's thesis, Federal University of Espírito Santo. *Supervisor: Prof. Fábio Malini*.
In Portuguese.

RESEARCH

Journal articles

2025 NetworkX-Temporal: Building, manipulating, and analyzing dynamic graph structures.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *SoftwareX 31, 102277*.

2025 Using Entropy Metrics to Analyze Information Processing Within Production Systems: The Role of Organizational Constraints.
Merode, F. v.; Boersma, H.; Tournois, F.; Winasti, W.; **Passos, N. A. R. A.**; Ham, A. v. d. *Logistics 9(2), 46*.

Conference papers

2026 Toward Efficient Community Detection on Time-Varying Attributed Graphs.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *In press: Proceedings of Euro-Par 2026 – PhD Symposium*. **Best PhD Symposium Paper Award.**

2026 Accelerating Dynamic Graph Clustering on GPU Architectures with cuGraph.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *In press: Proceedings of the 6th FRAME Workshop, co-located with Euro-Par 2026*. arXiv:2608.03695.

2025 TADC-SBM: a Time-varying, Attributed, Degree-Corrected Stochastic Block Model.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *Proceedings of the 30th IEEE Symposium on Computers and Communications (ISCC), 1–6*.

2024 Deep Community Detection in Attributed Temporal Graphs: Experimental Evaluation of Current Approaches.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *Proceedings of the 3rd Graph Neural Networking Workshop (GNNet), co-located with ACM CoNEXT 2024, 1–6*.

2014 The Perspective Form on Twitter: a quanti-qualitative technique for Social Network studies.
Regattieri, L. L.; Malini, F. L.; **Passos, N. A. R. A.**; Medeiros, J. M. *XXXVII Brazilian Congress of Communication Sciences (Intercom), Foz do Iguaçu, Brazil*. In Portuguese.

Preprints

2025 Time-varying ecological interactions characterise equilibrium and stability.
Caligiuri, A.; Emery, E.; Ferreira, L.; García-Castillo, J.; Lindner, S. D.; Molina-Hernández, J.; **Passos, N. A. R. A.**; Ribeiro, V. H.; Sartore, M.; Wang, B.; Calleja-Solanas, V. *arXiv:2506.22123 [q-bio.PE]*. Under submission.

Posters / Presentations

2026 Learning and Clustering on Temporal Graphs: Principles, Primitives, and Pooling.
Passos, N. A. R. A.; Carlini, E.; Trani, S. *Talk and poster, ECML PKDD 2026 – Nectar Track, Naples, Italy*. arXiv:2608.03696.

2026 Dynamic Graph Clustering with Graph Neural Networks.
Passos, N. A. R. A. *Poster, Learning on Graphs – Italian Meetup (LoG 2026), Pisa, Italy*.

2025 Efficient Neural Community Detection on Temporal Graphs: Challenges, Opportunities, and Advancements.
Passos, N. A. R. A. *Poster, Future Artificial Intelligence Research (FAIR 2025) General Conference, Rome, Italy*.

2025 Benchmarking Algorithmic and Neural Approaches for Temporal Community Detection.
Passos, N. A. R. A. *Lightning talk, International School and Conference on Network Science (NetSci 2025), Maastricht, Netherlands*. **Best Student Lightning Talk Award.**

2024 Deep Community Detection on Attributed Dynamic Graphs with a Spatio-Temporal Graph Neural Network.
Passos, N. A. R. A. *Poster, International School and Conference on Network Science (NetSciX 2024), Venice, Italy*.

Awards / Grants

2026 **Best PhD Symposium Paper Award**, 32nd International European Conference on Parallel and Distributed Computing (Euro-Par 2026).

2025 **Grant for Young Mobility**, Institute of Information Science and Technologies (CNR-ISTI), Italy.

2025 **Best Student Lightning Talk Award**, International School and Conference on Network Science (NetSci 2025).

Software / Data

2024 – now **NetworkX-Temporal**, PyPI package (author).
Python library for building, manipulating, and analyzing temporal graphs, with CPU and GPU backends for specific algorithms. Released with the SoftwareX 2025 paper.

2025 – now **TADC-SBM**, PyPI package (author).
Generator of Time-varying, Attributed, Degree-Corrected Stochastic Block Model graphs with known ground truth for controlled model evaluation. Released with the IEEE ISCC 2025 paper.

2024 **PubMed-Temporal**, Zenodo dataset and PyPI package (author).
Dynamic citation graph with node-level features for temporal node classification and link prediction benchmarks. Released with the ACM CoNEXT/GNNet 2024 paper.

Commissioned research

2017 **Global Education and Social Networks**, Labic, Federal University of Espírito Santo.
Commissioned by the International Commission on Financing Global Education Opportunity (Education Commission).

2016 **Zika Virus: digital data analysis from Brazil and the world**, Labic, Federal University of Espírito Santo.
Commissioned by the United Nations Children's Fund (UNICEF).

Other academic service

2024 – 2026 **Peer review**.
AISTATS (2026), Wiley journals (2026), IEEE BigDataService (2026), HPDC (2026), Canadian AI (2025–26), ACM SAC (2025), ECAI (2024–25).

2024 **Conference organization**.
Assistant co-organizer of HPDC 2024 and QUATIC 2024 in Pisa, Italy.

PROFESSIONAL EXPERIENCE

R&D positions

2026 – now **Postdoctoral Researcher**, High Performance Computing Laboratory – Institute of Information Science and Technologies, National Research Council of Italy (CNR-ISTI).
Researching spectral methods and graph neural networks for learning on temporal graphs, and developing GPU-accelerated algorithms for large-scale network analysis.

2022 – 2026 **Doctoral Researcher**, National PhD in Artificial Intelligence – University of Pisa, Department of Informatics / High Performance Computing Lab (CNR-ISTI), Italy.
Designed high-performance algorithms and machine learning models for clustering temporal graphs, and built NetworkX-Temporal, TADC-SBM, and the LMoN graph neural network.

2021 – 2022 **Research Engineer**, SouCiência Institute, Federal University of São Paulo, Brazil.
Built data processing pipelines for text and tabular data in interdisciplinary research projects.

2020 – 2021 **Machine Learning Engineer**, Culture Hack Labs, Canada.
Built NLP pipelines for topic modeling and entity recognition, and integrated semantic and large-scale network analysis into an analytics dashboard for the cultural sector.

2018 – 2019 **Back-end Software Developer**, The Rules, USA.
Developed web crawling, clustering, and network analysis pipelines for a communications dashboard, and supported research and policy work on trends in public social network activity.

2016 – 2017 **Data Engineer**, Private client, Ecuador.
Built and deployed automated data collection and processing pipelines as sole developer, and enabled daily reports from public news and social network data during a national election.

2014 – 2017 **Research Assistant**, Laboratory of Internet and Data Science (Labic), Federal University of Espírito Santo, Brazil. *2013*: Research Volunteer.
Developed social network analysis and OSINT tools for large-scale datasets, and built analytic tools for public-sector stakeholders, including UNICEF and Brazil's Ministry of Education.

International mobility

Jan–Feb 2026 **Visiting Researcher**, Complex Systems & Network Science Group, IT:U Austria, Linz.
Focus on probabilistic and machine learning models for temporal and attributed graphs. Host: Prof. Tiago P. Peixoto.

Apr–Jul 2024 **Visiting Researcher**, Department of Network and Data Science, Central European University, Vienna.
Focus on inferential community detection, algorithms, and generative models for temporal graphs. Host: Prof. Tiago P. Peixoto.

TA / Teaching experience

2026 **Teaching Assistant**, *Web Programming and Design*, B.Sc. in Humanistic Informatics, University of Pisa (30 h).

2022 **Lecturer**, *Introduction to Computational Social Sciences*, M.Sc. in Social Sciences, Federal University of Espírito Santo (4 h).

2017 **Lecturer**, *Introduction to Programming with Python*, M.Sc. in Communication, Federal University of Espírito Santo (4 h).

Tutorials / Workshops

2025 **Tutorial**, *Manipulating temporal networks using NetworkX-Temporal*, Complexity 72h Workshop, Madrid, Spain (1 h).

2013 **Workshop Tutor**, *Analyzing Social Life with Gephi*, Federal University of Espírito Santo, Brazil (30 h).
Co-author of accompanying open educational booklet. In Portuguese.

Talks / Panels

2026 **Seminar talk**, *Dealing with Large Networks: Temporal Graph Learning and Clustering*, Institute of Information Science and Technologies (CNR-ISTI), Pisa, Italy.

2021 **Online panel**, *Algorithms, Art, and Internet Activism*, Federal Universities of Juiz de Fora and Ouro Preto, Brazil.

2019 **Seminar talk**, *Impacts of New Communication and Information Technologies in Post-2013 Brazil*, Federal University of Espírito Santo, Brazil.

Other professional & training experience

2026 **Winter Workshop on Complex Systems**, Palma, Spain.
Co-authored project: *Connected by Science: Exploring Scientific Distance in the WWCS Network.*

2024 **ACM Europe Summer School**, Barcelona Supercomputing Center, Spain.
Training: *HPC Computer Architectures for AI and Dedicated Applications*.

OTHER

Programming	PyTorch/PyG, TensorFlow, scikit-learn, NumPy/SciPy, CuPy, NVIDIA RAPIDS (cuML, cuGraph), NetworkX-Temporal (author), graph-tool, igraph, NetworKit, Pandas/Dask
Systems	Linux/Shell, Slurm, Docker/Podman, Kubernetes, Airflow, AWS, Google Cloud, SQL and NoSQL (PostgreSQL/MySQL, MongoDB), graph databases (Neo4j, ArangoDB)
Languages	Portuguese (native), English and Italian (fluent), Spanish and French (reading)
Hobbies	Science fiction and fantasy books, going hiking, perpetually learning the bass

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