

Nelson Aloysio Reis de Almeida Passos

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I'm a Ph.D. candidate in Artificial Intelligence at the [University of Pisa](#) and at the [High Performance Computing laboratory](#), part of the [Institute of Information Science and Technologies \(ISTI\)](#) of Italy's [National Research Council \(CNR\)](#), with 10 years of experience in R&D in both academia and the industry.

As a **researcher**, my current project lies in the intersection between Network Science and AI: graph neural networks for node-level clustering of attributed temporal graphs. As a **developer**, I have experience in data engineering, data science, and machine learning, mostly using Python-based technology stacks.

EDUCATION

Ph.D. Artificial Intelligence <i>University of Pisa</i>	Est.: 2025 (3 years) <i>Pisa, Italy</i>
M.S. Social Science <i>Federal University of Espirito Santo</i>	2022 (2 years) <i>Vitoria, Brazil</i>
P.G. Data Science with Big Data <i>Federal Institute of Science and Technology of Espirito Santo</i>	2021 (2 years) <i>Serra, Brazil</i>
B.S. Communication <i>Federal University of Espirito Santo</i>	2018 (4 years) <i>Vitoria, Brazil</i>

EXPERIENCE

Doctoral researcher <i>National Research Council (ISTI-CNR), Italy</i>	Ongoing <i>Nov 2022 - Now</i>
– Project: “A Temporal Graph Neural Network for Dynamic Community Detection” (tentative title).	
Data scientist <i>Sou Ciencia Institute at Federal University of Sao Paulo, Brazil (Remote)</i>	1 year <i>Nov 2021 - Oct 2022</i>
– Supported the institute's research goals by developing tools for data mining and knowledge discovery through web scraping, natural language processing, and graph analysis and visualization tasks.	
Machine Learning engineer <i>Culture Hack Labs, Canada (Remote)</i>	~2 years <i>Jan 2020 - Oct 2022</i>
– Implemented natural language processing pipelines for topic modeling and entity recognition;	
– Implemented network analysis and unsupervised clustering algorithms for data mining tasks;	
– Prototyped dashboards to process and visualize analysis results from NLP models.	
Research fellow <i>ORGANON center at Federal University of Espirito Santo, Brazil</i>	3 years <i>Mar 2019 - Mar 2022</i>
– Collaborated on researches on social mobilization, digital activism, and online social networks;	
– Participated in the organization of events and seminars offered by the center in the University.	
Back-end developer <i>The Rules, USA (Remote)</i>	~2 years <i>Mar 2018 - Dec 2019</i>
– Developed automated data collection and scraping tools from news websites and online social networks;	
– Maintained the back-end of a web analytics dashboard, implementing data processing pipelines for unsupervised clustering, network analysis, and visualization tasks.	

- Research assistant** **4 months**
UNESCO's Education Commission (Remote) *Apr 2017 - Jul 2017*
 – Developed tools to enable the data collection and analysis from online sources, supporting the research on key challenges for the global education goals set by the Icheon Declaration for 2030.
- Data analyst** **8 months**
NDA, Ecuador (Remote) *Aug 2016 - Mar 2017*
 – Developed software to automate the process of collecting and analyzing data from online sources, supporting the delivery of daily intelligence reports for a general election campaign team.
- Research assistant** **6 months**
UNICEF (Remote) *Mar 2016 - Aug 2016*
 – Developed web scrapers and geo-epidemiological data processing pipelines;
 – Supported the investigation on key similarities and differences related to the arboviruses epidemics of Dengue (DENV), Zika (ZKV), and Chikungunya (CHKV) on global, national, and local scales.
- Research assistant** **3 years**
Labic at Federal University of Espirito Santo, Brazil *Jan 2014 - Dec 2016*
 – Collaborated on research experiments focused on collecting online data and analyzing social networks;
 – Developed analytical dashboards and tools focused at online social network monitoring/analysis;
 – Mixed methods analysis of tabular, image, and graph data sets to produce scientific diverse reports;
- Research intern** **6 months**
Labic at Federal University of Espirito Santo, Brazil *Jul 2013 - Dec 2013*
 – Collaborated in developing software for diverse data-driven research experiments in the laboratory.

PUBLICATIONS

DISSERTATIONS AND THESES

- Classifying communities in temporal networks by text: mapping the 2013-2018 Brazilian protests on Twitter* (2022). Master's thesis. Federal University of Espirito Santo. Supervisor: Prof. Cristiana Losekann. Funding: CAPES Foundation, Ministry of Education of Brazil.
- Cluster analysis using Markov Cluster Algorithm and the Louvain method: a case study of Wikipedia entries* (2021). Monograph. Federal Institute of Science and Technology of Espirito Santo. Supervisor: Prof. Jefferson Andrade.
- A tool for data journalism, social network analysis and cyberspace mapping* (2018). Bachelor's thesis. Federal University of Espirito Santo. Supervisor: Prof. Fabio Malini.

CONFERENCE SUBMISSIONS

- Nelson A. R. A. Passos** (2024). *Deep Community Detection with a Spatio-Temporal Graph Neural Network*. NetSciX: International School and Conference on Network Science, Venice (VEN), Italy.
- Nelson A. R. A. Passos** (2019). *Impacts of new information and communication technologies in post-2013 Brazil*. IV Proceedings of the Social Sciences Seminar PGCS-UFES, Vitória (ES), Brazil.
- Jean M. Medeiros, Patrick M. Ciarelli, Fábio L. Malini, Luisa Aboudib, **Nelson A. R. A. Passos** (2016). *Introduction to sentiment analysis in social networks: the lexicon built in two moments of the impeachment process*. IX ABCiber National Symposium, São Paulo (SP), Brazil.

Nelson A. R. A. Passos, Fábio L. Malini (2016). *The hashtag #ThereWillBeNoCoup in light of the perspectivist social network analysis method*. XXXIX Congress of Communication Sciences, São Paulo (SP), Brazil.

Fábio L. Malini, Gabriel H. C. Moura, **Nelson A. R. A. Passos** (2014). *Black Block and the Role of Social Media in Brazilian Demonstrations of September 7, 2013*. XIX Congress of Communication Sciences - Southeast Region, Vila Velha (ES), Brazil.

Fábio L. Malini, Priscilla Calmon, Jean M. Medeiros, **Nelson A. R. A. Passos** (2014). *Mapping the 'Ninja Media': an analysis of the emerging territorial collectivities on Facebook*. VIII ABCiber National Symposium, São Paulo (SP), Brazil.

Lorena L. Regattieri, Fábio L. Malini, **Nelson A. R. A. Passos**, Jean M. Medeiros (2014). *Perspectives on Twitter: a quanti-qualitative technique for social network studies*. XXXVII Congress of Communication Sciences, Foz do Iguaçu (PN), Brazil.

OTHER ACADEMIC WORKS

Global education and social networks (2017). Scientific report. UNESCO's Education Commission (NDA).

Zika Virus: analysis of digital data from Brazil and the world (2016). Scientific report. UNICEF (NDA).

Allan Cancian, Bianca Bortolon, Jean M. Medeiros, **Nelson A. R. A. Passos** (2013). *Gephi: An open-source software to handle and visualize graphs*. Lecture handout.

TEACHING EXPERIENCE

Lecture: Introduction to Computational Social Science
Federal University of Espirito Santo (Ufes) **Jun 2022**
Vitoria, Brazil

Crash course: Introduction to Programming with Python
Federal University of Espirito Santo (Ufes) **Dec 2017**
Vitoria, Brazil

Workshop: Analyzing social life with Gephi
Getulio Vargas Foundation (FGV) / Federal University of Espirito Santo (Ufes) **Dec 2013**
Vitoria, Brazil

PROGRAMMING EXPERIENCE

***nix** Docker & Podman, Git, k8s, OpenStack, OSTree, Shell, GNU tools (awk, cron, sed ...)

Cloud AWS (EC2, RDS, S3), G Cloud (BigQuery, GCE)

Databases ArangoDB, CassandraDB, MongoDB, MySQL, Neo4j, PostgreSQL

ML Gensim, Keras, PyTorch & PyTorch Geometric, scikit-learn, spaCy, Stanza, TensorFlow

Networks cdlib, graph-tool, HypergraphX, igraph, NetworkX, NetworKit

Other lib. Airflow, Altair, BeautifulSoup, Matplotlib, NLTK, Numpy, Pandas, Plotly, Polars, SciPy, Seaborn, Selenium, statsmodels, Streamlit ...

LANGUAGES

Portuguese (Native), **English** (C1), **Italian** (B1).