Luciano Melodia

Heckenweg 23, 91056 Erlangen luciano.melodia@fau.de +49 175 3372526

Education

Master of Science Mathematics *Oct. 2024 – Mar. 2026*
Friedrich-Alexander University Erlangen–Nuremberg
Minor: Digital Humanities
- **Thesis:** Universal Coefficients and the Mayer–Vietoris Sequence for Moore Homology

Bachelor of Science Mathematics *Oct. 2021 – Sept. 2024*
Friedrich-Alexander University Erlangen–Nuremberg
Minor: Computer Science
- **Thesis:** Algebraic and Topological Persistence

Master of Arts Information Science *Apr. 2015 – Mar. 2018*
University of Regensburg
Minor: Digital Humanities
- **Thesis:** Deep Learning for Estimating Absorbed Radiation Dose in Nuclear Medicine Diagnostics

Bachelor of Arts German Philology *Oct. 2012 – Mar. 2015*
University of Regensburg
Majors: German and Italian Philology, Information Science, Media Informatics
- **Thesis:** Development of a Punctuation Platform with Linguistic Modules for Information Retrieval

University of Regensburg *Oct. 2012 – Apr. 2013*
Concurrent IT Training Program

Professional Experience

FAU Department of Mathematics *Erlangen*
Research Assistant *Apr. 2023 – Sept. 2026*
- Tutor for Topology (2023, 2026), Functional Analysis (2026), Real Analysis III (2024, 2026), Real Analysis II (2025), Linear Algebra I (2024), Mathematics for Engineers A2: Calculus (2025), Mathematics for Engineers A4: Stochastics (2025), and Topology and Applications (2024).
- Substitute lecturer for courses taught by Prof. Dr. Li and Prof. Dr. Meusburger on the Tietze extension theorem, connectedness and path-connectedness, and continuity.
- Lecturer for course units on mathematical proof writing.
- Exam proctoring, grading, and mentoring.

Corscience GmbH & Co. KG *Erlangen*
Working Student *Aug. 2021 – Aug. 2022*
- Deep convolutional networks on multi-GPU systems for automatic detection of calibration spikes in ECG data achieving >99 % accuracy (10-fold cross-validation, approx. 1M real-world samples, state of the art).
- Residual networks for detection of ECG traces in documents with an IoU of approx. 98 % (10-fold cross-validation, approx. 10M augmented samples), state-of-the-art image segmentation.
- Image segmentation of ECG traces using matrix factorization methods with an IoU of approx. 99 %, statistically highly significant, state of the art.

Siemens Energy AG *Erlangen*
Research Associate *Sept. 2018 – Dec. 2021*
- Development of a novel topology-based interpolation method for industrial sensor data and handwriting data; published at IWCIA, with an open-source implementation.
- Design of a method to estimate the capacity of neural networks for signal data; reduction of training costs by approx. €25,000 per year; presented at ICPR, source code available as open source.
- Development of a hierarchical KKS classifier for power-plant sensors using topological data analysis (Betti curves) with accuracies of up to 93 %; published at PKDD, with an open-source implementation.
- Extensive teaching and examination experience in data science and computer science (lectures, seminars, tutorials, e-exams) with excellent course evaluations.
- Supervision of multiple B.Sc. and M.Sc. theses on sensor-signal classification, ECG analysis, gas-sensor time series, and industrial dashboards.

- Technologies: Python (3.8/3.9), TensorFlow 2.x, CUDA 11, cuDNN 8, Linux (Ubuntu, Arch), and Windows.
- Teaching assistant for Conceptual Modeling (2019), New Technologies in Data Management (2019, 2020, 2021), Process-Oriented Information Systems (2019, 2020, 2021), Topological Data Analysis (2020), Homological Data Analysis (2021).
- Lecturer for Knowledge Discovery in Databases (2021).

mb Support GmbH *Regensburg*
Scientific Stuff *June 2015 – Mar. 2018*

- Industrial document digitization pipeline using high-performance OCR.
- Integration of the Asterisk telephony API into Openviva C2.
- Market and statistical analysis using deep learning.

Chair of German Linguistics *University of Regensburg*
Research Assistant *Oct. 2013 – Sept. 2015*

- Subject-matter editing and proofreading of academic texts and examinations.
- Organization and coordination of academic conferences.
- Technical maintenance and updates of the university website.
- Design and implementation of an academic social network.

Apostelkeller *Regensburg*
Chef *Sept. 2012 – Dec. 2015*

- Planning and preparing menus for up to 140 guests.
- Front-of-house support and waiting tables with direct guest interaction.
- Inventory management and stock control in the kitchen.

Anatol GmbH & Co. KG *Regensburg*
Translator *Oct. 2012 – Aug. 2014*

- Translation between Italian, German, Polish, and English.

Skills

Programming: Python (expert), Rust (advanced), C++ (basic)
Web Technologies: HTML5, CSS3 (expert), JavaScript, PHP (advanced)
Typesetting: LaTeX (expert)
Operating Systems: Linux (Arch, Ubuntu) and macOS (expert), Windows (advanced)
Languages: German (native), English (C2), Italian (C2), Polish (B2), Spanish (A2)
Sports: Lifting (240kg Deadlift, 120kg Bench, 150kg Squat), Muay Thai 4:2:1 – W:L:D ●, Weng Chun ●
Hobbies: Competitive cooking, fiction (Amor Towles & Benedict Jacka)

Publications

Homological Time Series Analysis of Sensor Signals from Power Plants. 2021
Luciano Melodia, Richard Lenz
10.1007/978-3-030-93736-2_22

Estimate of the Neural Network Dimension Using Algebraic Topology and Lie Theory. 2021
Luciano Melodia, Richard Lenz
10.1007/978-3-030-68821-9_2

Persistent Homology as a Stopping Criterion for Voronoi Interpolation. 2020
Luciano Melodia, Richard Lenz
10.1007/978-3-030-51002-2_3

On the Use of the Verb *brauchen* with and without *zu* with the Infinitive. 2015
Luciano Melodia
ISBN 978-3-8325-3808-8

Conferences

Reviewer: Learning on Graphs (LOG, 2022–24), DBKDA (2020–24), GT-RL @ ICLR (2022), TDA in ML @ NeurIPS (2020).
Author: ICPR (2021), IWCIA (2020), ECML PKDD (2019–2020), Destandardization and Standard Variety (2013).
Invited Talk: International Conference on Practical Mathematical Discourse (2020).
Attendance: Colloquium on Lie Groups, SIGMOD/PODS (2020), Language Management and Orthography (2015).

Awards, Scholarships, and Service

Best Reviewer Award, Learning on Graphs (LOG)	*2024*
Recipient of the Oskar Karl Forster Scholarship	*2024*
Student Representative for the Department of Mathematics, Friedrich-Alexander University Erlangen–Nuremberg	*2024*
Member of the German Informatics Society	*2019–2020*
Member of the Computational Intelligence and Machine Learning Research Group (CIML)	*2017–2018*
Student Representative for the Faculty of Language, Literature, and Cultural Studies, University of Regensburg	*2016*