

# Luciano Melodia

📍 Erlangen

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🔗 karhunenloeve

## Education

<b>Friedrich-Alexander Universität Erlangen Nürnberg (Ø 1.1)</b> <i>M.Sc. Mathematics, Digital Humanities</i>	<i>Oct 2024 – March 2026</i>
<ul style="list-style-type: none"> <li>◦ <b>Thesis:</b> Universal Coefficients for Étale Groupoid Homology</li> <li>◦ <b>Topics:</b> Algebraic Topology, Tensor Categories, Homological Algebra</li> </ul>	
<b>Friedrich-Alexander Universität Erlangen Nürnberg (Ø 2.0)</b> <i>B.Sc. Mathematics, Computer Science</i>	<i>Oct 2021 – Sept 2024</i>
<ul style="list-style-type: none"> <li>◦ <b>Thesis:</b> Algebraic and Topological Persistence (1.0)</li> <li>◦ <b>Topics:</b> Applied Topology, Persistent Homology</li> </ul>	
<b>Universität Regensburg (Ø 1.6)</b> <i>M.A. Information Science</i>	<i>April 2015 – March 2018</i>
<ul style="list-style-type: none"> <li>◦ <b>Thesis:</b> Deep Learning Estimation of Absorbed Radiation Dose (1.3)</li> <li>◦ <b>Topics:</b> Machine Learning, Deep Learning, Matrix Factorization</li> </ul>	
<b>Universität Regensburg (Ø 2.0)</b> <i>B.A. German Philology, Italian Philology, Media Informatics, Information Science</i>	<i>Oct 2012 – March 2015</i>
<ul style="list-style-type: none"> <li>◦ <b>Thesis:</b> Development of a Punctuation Platform with Linguistic Modules for Information Retrieval (1.7)</li> <li>◦ <b>Topics:</b> Natural Language Processing, Information Retrieval, Electronic Corpora</li> </ul>	
<b>Universität Regensburg (Ø 1.7)</b> <i>Studienbegleitende IT-Ausbildung</i>	<i>Oct 2012 – April 2013</i>
<b>Albertus-Magnus-Gymnasium Regensburg (Ø 2.7)</b> <i>Abitur</i>	<i>Sept 2004 – May 2012</i>

## Experience

<b>Student Assistant</b> <i>Algebra and Geometry</i> <i>Representation Theory and Operator Algebras</i> <i>Applied Analysis</i> <i>Applied Mathematics</i>	<i>Erlangen</i> <i>April 2023 – March 2026</i>
<ul style="list-style-type: none"> <li>◦ 2025 Tutor in Mathematics for Engineers A4 (stochastic)</li> <li>◦ 2025, 2024 Tutor in Analysis 3, 2</li> <li>◦ 2024 Tutor in Topology and Applications</li> <li>◦ 2024 Tutor in Linear Algebra 1</li> <li>◦ 2023 Tutor in Topology</li> <li>◦ Lecture on the Tietze Extension Theorem</li> <li>◦ Lecturer for mathematical proof sessions</li> <li>◦ Lecturer for exercise sessions</li> <li>◦ Supervision and correction of written exams</li> </ul>	
<b>Tutor</b> <i>Private</i>	<i>Erlangen</i> <i>Jan 2024 – Dez 2025</i>
Preparation for	
<ul style="list-style-type: none"> <li>◦ mathematics, 2 students, undergraduate studies</li> <li>◦ computer science, 1 student, undergraduate studies</li> <li>◦ chemical and biological engineering, 1 student, undergraduate studies</li> <li>◦ physics, 1 student, undergraduate studies</li> </ul>	

- Abitur, 13 students, bavarian Gymnasium
- secondary school, 2 students, bavarian Mittelschule
- secondary school, 3 students, bavarian Realschule
- elementary school, 1 student, bavarian Grundschule

### **Werkstudent**

*Corscience GmbH & Co. KG*

*Erlangen*

*Aug 2021 – Aug 2022*

- Deep convolutional networks trained on multiple GPUs for automatic detection of calibration spikes in ECG data; achieved an accuracy of over ninety-nine percent on ten-fold cross validation with a data set of about one million real world samples tested with sigma five significance, which is state of the art
- Residual networks for detection of ECG curves in documents; achieved an IOU of approximately ninety-eight percent on ten-fold cross validation with a data set of about ten million artificially enlarged samples using generative neural networks tested with sigma three significance, which is state of the art
- Image segmentation using matrix factorisation techniques to isolate ECG curves. Achieved an IOU of approximately ninety-nine percent tested with sigma six significance, which is state of the art

### **Research Assistant**

*Chair for Computer Science 6 / Siemens Energy AG*

*Erlangen*

*Sept 2018 – Dez 2021*

- Correction of written exams
- Assistance in oral exams
- Preparation and execution of electronic exams
- Participation in the data science program
- Supervision and execution of
  1. 2021 lecture on Knowledge Discovery in Databases Ø1.56
  2. 2020 seminar on Persistent Homology in Data Analytics
  3. 2020 seminar on Topological Data Analysis Ø1.14
  4. 2019, 2020, 2021 exercises in Process Oriented Information Systems Ø1.18
  5. 2018, 2019, 2020, 2021 seminar on New Technologies in Data Management
  6. 2018, 2019, 2020, 2021 exercises in Computer Science for Engineers
  7. 2018 exercises in Conceptual Modeling
- Supervision of theses:
  1. M.Sc. Sauerhammer (2021): A Classification Dashboard for Sensor Signals from Power Plants
  2. M.Sc. Seidel (2020): Classification of Microbes using Time Series Gas Sensor Array Data
  3. M.Sc. Siddiqui (2020): Extraction of Fetal and Maternal Heart-beats from ECG Signals
  4. B.Sc. Hahn (2021): Classification of Sensor Signals from Power Plants
  5. B.Sc. Schäfer (2021): Learning Validation Models from Sensors of a Power Plant
- Programming with CUDA v.11.0, Tensorflow 2.4, CuDNN v.8.0.4. in Python v.3.8 and v.3.9
- Operating systems: Ubuntu 20.04, Solus 4, Archlinux 5.11, Windows 11

### **Data Scientist**

*mb Support GmbH*

*Regensburg*

*June 2015 – March 2018*

- Industrial document-digitization pipeline for mass paper-pile scanning; scanning-street engineering; one-percent character-error-rate OCR via Google Cloud Vision and custom recurrent neural networks; ergonomic user-interface integration for Openviva C2; Industrial scanning throughput benchmark: capacity for approximately sixty million documents in continuous operation
- Asterisk telecommunication-API integration into Openviva C2 with ergonomic design, roughly five thousand lines of PL/SQL and Python
- Statistical data and market analysis with deep neural and convolutional networks and regression methods

### **Research Assistant**

*Chair for German Linguistics*

*Universität Regensburg*

*Oct 2013 – Sept 2015*

- Proofreading of books and papers
- Correction of exams
- Organisation of conferences
- Maintenance of the university website
- Implementation of a scientific social network featuring a custom JavaScript-written search engine for real-time online usage, comprising approximately a thousand lines of code

### Chef

*Apostelkeller*

*Regensburg  
Sept 2012 – Dez 2015*

- Cooking with menu for up to 140 guests
- Waitressing
- Stock management

### Service Staff

*Trademarketing Service GmbH*

*Regensburg  
Nov 2012 – Mai 2015*

- Goods management, receipt and ordering.

### Translator

*Anatol GmbH & Co. KG*

*Regensburg  
Oct 2012 – Aug 2014*

- Translation between Italian – German – Polish – English

### Volunteer

*Alten- und Pflegeheim St. Josef*

*Regensburg  
Aug 2010*

## Publications





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<b>Homological Time Series Analysis of Sensor Signals from Power Plants.</b> <i>Luciano Melodia</i> , Richard Lenz 10.1007/978-3-030-93736-2_22 <a href="#">↗</a>	2021
<b>Estimate of the Neural Network Dimension Using Algebraic Topology and Lie Theory.</b> <i>Luciano Melodia</i> , Richard Lenz 10.1007/978-3-030-68821-9_2 <a href="#">↗</a>	2021
<b>Persistent Homology as a Stopping Criterion for Voronoi Interpolation.</b> <i>Luciano Melodia</i> , Richard Lenz 10.1007/978-3-030-51002-2_3 <a href="#">↗</a>	2020
<b>Zur Verwendung des Paradigmas <i>brauchen</i> mit und ohne <i>zu</i> mit Infinitiv.</b> <i>Luciano Melodia</i> ISBN 978-3-8325-3808-8 <a href="#">↗</a>	2015

## Conferences





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Learning on Graphs, LOG <a href="#">↗</a> ◦ Reviewer, Program Committee	2022-24
Advances in Databases, Knowledge, and Data Applications <a href="#">↗</a> ◦ Reviewer, Program Committee	2020-24
Geometrical and Topological Representation Learning, Workshop at ICLR <a href="#">↗</a> ◦ Reviewer, Program Committee	2022
International Conference on Pattern Recognition <a href="#">↗</a> ◦ Author, full paper	2021
International Workshop on Combinatorial Image Analysis <a href="#">↗</a> ◦ Author, full paper	2020
International Conference on Practical Mathematical Discourse <a href="#">↗</a> ◦ Guest talk, Introduction to Persistent Homology	2020
Topological Data Analysis and Beyond, Workshop at NeuRIPS <a href="#">↗</a>	2020

◦ Reviewer, Program Committee	
Symposium on Principles of Database Systems, SIGMOD/PODS 	2020
European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases, ECML/PKDD 	2019-2020
◦ Author, full paper	
Sprachmanagement & Orthografie 	2015
Destandardisierung und Standardvarietät 	2013
◦ Author, full paper	

## Awards, Grants and Service

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Top Reviewer Award from Learning on Graphs 	2024
Oskar-Karl-Forster Scholarship Fellow 	2024
Student Representative for the Department of Mathematics at Friedrich-Alexander Universität Erlangen-Nürnberg	2024
Member of the Gesellschaft für Informatik e.V. 	2019-20
Member of the Computational Intelligence and Machine Learning Group 	2017-18
Student Representative for the Department of Language, Literature and Cultural Sciences at Universität Regensburg	2016

## Addendum

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**Programming:** Python, Rust, C++

**Web Technologies:** HTML5, CSS3, Javascript, PHP

**Typesetting:** L<sup>A</sup>T<sub>E</sub>X

**Operating Systems:** Arch Linux, Ubuntu, Mac OS, Windows




**Languages:** German native, English C2, Italian C2, Polish B2, Spanish A2


**Sports:** Muay Thai, Boxing, Weng Chun, Table Tennis

**Hobbies:** Cooking, Novels


## References

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Prof. Dr. Catherine Meusburger 	2024-26
◦ Department of Mathematics	
◦ Friedrich-Alexander Universität Erlangen-Nürnberg	
◦ Professor for Representation Theory and Mathematical Physics	
✉ catherine.meusburger@fau.de	
📞 +49 9131 85-67034	
Prof. Dr. Kang Li 	2022-26
◦ Department of Mathematics	
◦ Friedrich-Alexander Universität Erlangen-Nürnberg	
◦ Professor for Representation Theory and Operator Algebras	
✉ kang.li@fau.de	
📞 +49 9131 85-67060	
Prof. Dr. Richard Lenz 	2018-21
◦ Department of Computer Science	
◦ Friedrich-Alexander Universität Erlangen-Nürnberg	
◦ Professor for Evolutionary Data Management	
✉ richard.lenz@fau.de	
📞 +49 9131 85-27899	

Prof. Dr. em. Elmar Lang   
◦ Department of Biophysics  
◦ Universität Regensburg  
◦ Professor for Computational Intelligence  
✉ `elmar.w.lang@ur.de`

*2018-21*

Prof. Dr. Paul Rössler   
◦ Department of German Philology  
◦ Universität Regensburg  
◦ Professor for German Linguistics  
✉ `paul.roessler@ur.de`  
☎ +49 941 943-3444

*2013-16*