

Peter Juhasz — Researcher

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📄 ResearchGate • in LinkedIn • 🐙 GitHub

Summary

I am a PhD Candidate in Mathematics at Aarhus University, supervised by Christian Hirsch. My doctoral research combines stochastic processes and topological data analysis to create novel models for complex networks. Prior to my PhD, I worked as a deep learning researcher in automated driving at Bosch Group Hungary, where I developed algorithms for vehicle perception, prediction and decision-making. Additionally, I led the design and implementation of scalable software solutions as a software architect in the same field.

Education

PhD in Mathematics

Aarhus University, Denmark, Stochastic Point Processes and Topological Data Analysis 2022–
Supervisors: Dr. Christian Hirsch, Dr. Claudia Strauch
Thesis: Point Process Based Models of Evolving Higher-Order Networks

Master of Business Administration with Highest Honors

Budapest University of Technology and Economics, Hungary, Specialized in Finance 2019–2021
Supervisor: Dr. Roland Molontay
Thesis: Prediction of Popularity of Memes using Machine Learning Methods

Master of Science in Physics

Budapest University of Technology and Economics, Hungary, Specialized in Applied Physics 2013–2016
Supervisor: Dr. Gabor Vattay
Thesis: Examination of Spatially Embedded Complex Networks
Erasmus+ Scholarship: Delft University of Technology (Applied Physics)

Bachelor of Science in Physics

Budapest University of Technology and Economics, Hungary, Specialized in Applied Physics 2010–2013
Supervisor: Dr. Szabolcs Beleznai
Thesis: Finite Element Method Plasma Simulation of Nitrogen Contaminated Ceramic Metal Halide Lamps

Professional Experience

Research Assistant in Spatial Stochastics and Topological Data Analysis

Department of Mathematics, Aarhus University, Denmark 2022–

- Published 4 papers in stochastic models for higher-order networks
- Implemented topological data analysis algorithms on simulated spatial point processes
- Spent 3 months at TU Braunschweig supervised by Dr. Benedikt Jahnel (Weierstrass Institute for Applied Analysis and Stochastics, Berlin)
- Taught 4 courses in mathematics and computer science

Deep Learning Researcher in Automated Driving

Department of Automated Driving, Bosch Group Hungary 2021–2022

- Patented a Gaussian regression based trajectory prediction model for automated driving
Analyzed more than 20 000 hours of measurements of passenger car driving
Enhanced prediction accuracy by a factor of 3 and the uncertainty estimation by a factor of 10
- Object detection and classification with ultrasonic sensors:
Designed several features to represent objects and free space
Implemented a U-Net neural network to detect and classify objects
- Real time object tracking with temporal convolutional neural networks:
Improved a feature pyramid network to track objects in real time

Software Architect in Automated Driving

Department of Automated Driving, Bosch Group Hungary

2018–2021

- Lead a team of 11 in environment prediction as a technical lead
- Created a concept for automated ground-truth generation for data-driven machine learning development
- Coordinated 2 teams in the integration of driver monitoring camera for hands-free driving

Software Engineer for Mobile Networks

Business Unit IT & Cloud Products, Ericsson Telecommunications Hungary

2016–2018

- Analyzed response times of distributed database servers for optimal load balancing
- Coordinated a team of 8 as a deputy of the product owner
- Implemented performance critical algorithms for Smart Services Routers

Publications, Patents

- C. Hirsch, B. Jahnel, S. K. Jhavar and **P. Juhasz**. *Poisson approximation of fixed-degree nodes in weighted random connection models*, Stochastic Process. Appl. **183** (2025), 104593, DOI 10.1016/j.spa.2025.104593. 2025
- M. Brun, C. Hirsch, **P. Juhasz** and M. Otto. *Random connection hypergraphs*, arXiv:2407.16334, 2024, DOI 10.48550/arXiv.2407.16334. 2024
- K. Barnes, **P. Juhasz**, M. Nagy and R. Molontay. *Topicality boosts popularity: a comparative analysis of NYT articles and Reddit memes*, Soc. Netw. Anal. Min. **14** (2024), no. 119, DOI 10.1007/s13278-024-01272-3. 2024
- C. Hirsch and **P. Juhasz**, *On the topology of higher-order age-dependent random connection models*, arXiv:2309.11407, 2023, DOI 10.48550/arXiv.2309.11407. 2023
- P. Juhasz**, *Information propagation in stochastic networks*, Phys. A **577** (2021), 126070, DOI 10.1016/j.physa.2021.126070. 2021
- P. Juhasz**, *Method and device for predicting the trajectory of a traffic participant, and sensor system*, CNIPA: CN113988353A, EPO: EP3916697A1, JPO: JP2021190119A, USPTO: US2021366274A1, 2021. 2021
- P. Juhasz**, J. Steger, D. Kondor and G. Vattay, *A Bayesian approach to identify Bitcoin users*, PLoS One **13** (2018), e0207000, DOI 10.1371/journal.pone.0207000. 2018
- P. Juhasz**, Sz. Beleznaï and I. Maros, *Finite element method plasma simulation of nitrogen contaminated metal halide lamps*, Comsol Conference Proceedings, 2014. 2014

Awards, Grants

Individual Travel Grant

European Mathematical Society

2025

500 EUR – Talk "Random Connection Hypergraphs" at GPSD 2025 conference

Academic Mobility Grant for International Exchange

Aarhus University

2024

20 000 DKK – Evolving Stochastic Network Models

PhD Fellowship Grant (DDSA-PhD-2022-008)

Danish Data Science Academy

2022–2025

1 890 000 DKK – Topological Data Analysis Based Models of Evolving Higher-Order Networks

Excellence Award for Outstanding Thesis and Diploma Work

Hungarian National Bank

2021

350 000 HUF – Digitalization, Artificial Intelligence, and the Age of Data – What Makes a Meme Viral?

Conferences, Events

Talks

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| Scaling Limits in Spatial Birth-Death Systems with Long-Range Interactions <i>Stochastic Interacting Particle Systems and Random Matrices</i> | 2025 |
| Random Connection Hypergraphs <i>German Probability and Statistics Days 2025</i> | 2025 |
| Stochastic Random Connection Models <i>Probability Seminar</i> | 2024 |
| Topological Data Analysis Based Models of Evolving Higher-Order Networks <i>Qualifying Exam</i> | 2024 |
| Adaptive Trajectory Prediction Based on a Gaussian Regression Model <i>Bosch Group: Bosch Innovation Day</i> | 2020 |
| Probabilistic Localization of Bitcoin Users <i>Hungarian Academy of Sciences: Statistical Physics Conference</i> | 2016 |

Posters

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| Simplex Count Distribution in Random Connection Hypergraphs <i>Particle Systems in Random Environments</i> | 2024 |
| Distribution of Betti Numbers in Age-Dependent Random Connection Models <i>DDSA Annual Conference</i> | 2024 |
| Topological Data Analysis of Higher-Order Networks <i>Danish-Swedish Summer School on TDA and Spatial Statistics</i> | 2023 |
| Dissecting Distributed Database Systems For Telecom Applications <i>Ericsson Telecommunications Hungary: Ericsson University Day</i> | 2016 |
| Finite Element Method Plasma Simulation of Ceramic Metal Halide Lamps <i>Comsol Multiphysics Conference</i> | 2014 |

Programming Skills

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|--------|---|---|---|---|---|
| Python | ● | ● | ● | ● | ● |
| Git | ● | ● | ● | ● | ● |
| C++ | ● | ● | ● | ● | ● |

Languages

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|-----------|---|---|---|---|---|
| Hungarian | ● | ● | ● | ● | ● |
| English | ● | ● | ● | ● | ● |
| German | ● | ● | ● | ● | ● |

Teaching

Advanced Probability Theory

Aarhus University, Course Code: F25.550171U020
10 ECTS Exercise Class, Spring Semester

2025

Data Project

Aarhus University, Course Code: F24.550201U004
10 ECTS Computer Project Class, Spring Semester

2024

Linear Transformations

Aarhus University, Course Code: E23.550171U010
10 ECTS Exercise Class, Autumn Semester

2023

Ordinary Differential Equations

Aarhus University, Course Code: F23.550141U011
5 ECTS Exercise Class, Spring Semester

2023

Advanced Calculus for Engineers

Aarhus University, Course Code: F23.280191U021
10 ECTS Exercise Class, Spring Semester

2023