

Nikolaos Nakis

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Research Profile

Computational social scientist working at the intersection of **network science, statistics, and social systems**. My research develops principled and interpretable models for understanding social interactions, inequality, and polarization in large-scale networked data.

- Statistical modeling of social networks and interdependent systems
- Social structure, inequality, and behavioral organization
- Interpretable and explainable models for complex social data

Employment

Postdoctoral Researcher, Yale University Oct 2024 – Present
Human Nature Lab, Yale Institute for Network Science

- Develop statistical models for large-scale social network data
- Study social roles, inequality, and resource allocation across health and economic systems
- Collaborate on interdisciplinary research connecting network science with social science applications

Postdoctoral Researcher, École Polytechnique Oct 2023 – Jun 2024
LIX, Data Science and Mining Group

- Developed graph generative models and interpretable machine learning methods for network data

Education

PhD, Technical University of Denmark 2020 – 2023
Research focus: Graph representation learning for social and complex systems
Advisors: Prof. Morten Mørup and Prof. Sune Lehmann

MSc in Mathematical Modelling and Computation, Technical University of Denmark
2018 – 2020

Thesis: *Continual Learning and Catastrophic Forgetting*

BSc in Physics, National and Kapodistrian University of Athens 2012 – 2017
Thesis: *From Spin Glasses to Neural Networks*

Selected Publications

Modeling roles and trade-offs in multiplex networks. 2026
Nikolaos Nakis, Sune Lehmann, Nicholas A. Christakis, and Morten Mørup.
Nature Communications. [link](#)

Multiplex mapping of social roles in isolated Honduran village networks. 2026
Nikolaos Nakis, Sune Lehmann, Morten Mørup, and Nicholas A. Christakis.
Under review (PNAS). [link](#)

How Low Can You Go? Searching for the Intrinsic Dimensionality of Complex Networks using Metric Node Embeddings. 2025

Nikolaos Nakis, Niels Raunkjær Holm, Andreas Lyhne Fiehn, and Morten Mørup.
International Conference on Learning Representations (ICLR). [link](#)

Archetypal Graph Generative Models: Explainable and Identifiable Communities via Anchor-Dominant Convex Hulls. 2026

Nikolaos Nakis, Chrysoula Kosma, Panagiotis Promponas, Michail Chatzianastasis, and Giannis Nikolentzos.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).
Spotlight. [link](#)

Aitchison Embeddings for Learning Compositional Graph Representations. 2026

Nikolaos Nakis, Chrysoula Kosma, Panagiotis Promponas, Michail Chatzianastasis, and Giannis Nikolentzos.

Proceedings of the International Conference on Machine Learning (ICML). [link](#)

Characterizing Polarization in Social Networks using the Signed Relational Latent Distance Model. 2023

Nikolaos Nakis, Abdulkadir Çelikkanat, Louis Boucherie, Christian Djurhuus, Felix Burmester, Daniel Mathias Holmelund, Monika Frolcova, and Morten Mørup.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).
[link](#)

Publications

Modeling roles and trade-offs in multiplex networks. 2026

Nikolaos Nakis, Sune Lehmann, Nicholas A. Christakis, and Morten Mørup.

Nature Communications.

Multiplex mapping of social roles in isolated Honduran village networks. 2026

Nikolaos Nakis, Sune Lehmann, Morten Mørup, and Nicholas A. Christakis.

Under review (PNAS).

Rank Is Not Capacity: Spectral Occupancy for Latent Graph Models. 2026

Nikolaos Nakis, Panagiotis Promponas, Konstantinos Tsirkas, Katerina Mamali, Eftychia Makri, Leandros Tassioulas, and Nicholas A. Christakis.

Preprint (arXiv:2605.11142).

Aitchison Embeddings for Learning Compositional Graph Representations. 2026

Nikolaos Nakis, Chrysoula Kosma, Panagiotis Promponas, Michail Chatzianastasis, and Giannis Nikolentzos.

Proceedings of the International Conference on Machine Learning (ICML).

Archetypal Graph Generative Models: Explainable and Identifiable Communities via Anchor-Dominant Convex Hulls. 2026

Nikolaos Nakis, Chrysoula Kosma, Panagiotis Promponas, Michail Chatzianastasis, and Giannis Nikolentzos.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).
Spotlight.

InvGNN: Learning Invertible Node Representations on Graphs. 2026

Giannis Nikolentzos, Dimitrios Kelesis, and **Nikolaos Nakis**.

Proceedings of the International Conference on Machine Learning (ICML).

Signed Graph Autoencoder for Explainable and Polarization-Aware Network Embeddings. 2025

Nikolaos Nakis, Chrysoula Kosma, Giannis Nikolentzos, Michail Chatzianastasis, Iakovos Evdaimon, and Michalis Vazirgiannis.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).

How Low Can You Go? Searching for the Intrinsic Dimensionality of Complex Networks using Metric Node Embeddings. 2025

Nikolaos Nakis, Niels Raunkjær Holm, Andreas Lyhne Fiehn, and Morten Mørup.

International Conference on Learning Representations (ICLR).

The Signed Two-Space Proximity Model for Learning Representations in Protein-Protein Interaction Networks. 2025

Nikolaos Nakis, Chrysoula Kosma, Anastasia Brativnyk, Iakovos Evdaimon, Michail Chatzianastasis, and Michalis Vazirgiannis.

Bioinformatics.

Continuous-time Graph Representation with Sequential Survival Process. 2024

Abdulkadir Çelikkanat, Nikolaos Nakis, and Morten Mørup.

AAAI Conference on Artificial Intelligence.

Time to Cite: Modeling Citation Networks using the Dynamic Impact Single-Event Embedding Model. 2024

Nikolaos Nakis, Abdulkadir Çelikkanat, Louis Boucherie, Sune Lehmann, and Morten Mørup.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).

A Hierarchical Block Distance Model for Ultra Low-Dimensional Graph Representations. 2023

Nikolaos Nakis, Abdulkadir Çelikkanat, Sune Lehmann, and Morten Mørup.

IEEE Transactions on Knowledge and Data Engineering.

Characterizing Polarization in Social Networks using the Signed Relational Latent Distance Model. 2023

Nikolaos Nakis, Abdulkadir Çelikkanat, Louis Boucherie, Christian Djurhuus, Felix Burmester, Daniel Mathias Holmelund, Monika Frolcova, and Morten Mørup.

Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS).

A Hybrid Membership Latent Distance Model for Unsigned and Signed Integer Weighted Networks. 2023

Nikolaos Nakis, Abdulkadir Çelikkanat, and Morten Mørup.

Advances in Complex Systems.

HM-LDM: A Hybrid-Membership Latent Distance Model. 2022

Nikolaos Nakis, Abdulkadir Çelikkanat, and Morten Mørup.

Complex Networks Conference.

Piecewise-Velocity Model for Learning Continuous-time Dynamic Node Representations. 2022

Abdulkadir Çelikkanat, Nikolaos Nakis, and Morten Mørup.

Learning on Graphs Conference (LoG).

Funding & Awards

Gold Reviewer Award, International Conference on Machine Learning (ICML) – top reviewer recognition 2026

Augustinus Foundation Research Mobility Grant for external research stay at Yale University 2023

Otto Mønsted Foundation Research Mobility Grant for external research stay at Umeå University 2022

Best Paper Award, Temporal Graph Learning Workshop, Neural Information Processing Systems (NeurIPS) 2023

Teaching Experience

Lecturer, Advanced Topics in Machine Learning (PhD course) 2022
Topic: Graph Representation Learning

Teaching Assistant, Machine Learning Operations 2023

Teaching Assistant, Social Graphs and Interactions 2021

Teaching Assistant, Intro to Machine Learning and Data Mining 2020 – 2021

Teaching Assistant, Model-Based Machine Learning 2020

Supervision and Mentoring

Co-supervised over 10 MSc and BSc students across multiple thesis projects in machine learning, network science, and computational social science.

Two supervised thesis projects resulted in publications accepted at leading AI conferences: AISTATS and ICLR.

Academic Service

Journal Reviewer: Nature Scientific Reports; *Network Science*; *IEEE Transactions on Knowledge and Data Engineering*; *Knowledge and Information Systems*; *Transactions on Machine Learning Research*

Conference Reviewer: Neural Information Processing Systems (NeurIPS); International Conference on Learning Representations (ICLR); International Conference on Artificial Intelligence and Statistics (AISTATS); International Conference on Machine Learning (ICML)

Conference Presentations and Talks

Modeling 2-Level Polarization in Signed Networks, International Conference on Computational Social Science (IC2S2) 2025

Characterizing Polarization in Social Networks using Archetypal Analysis, International Conference on Computational Social Science (IC2S2) 2023

The Hybrid-Membership Latent Distance Model, International Conference on Complex Networks 2022

Technical Skills

Programming: Python, PyTorch

Other: R, MATLAB, SQL, Docker, Stan