Konstantinos Pantazis

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Academic Profile

Applied mathematician and computational network scientist specializing in statistical network analysis, graph matching, multiplex networks, and machine learning for heterogeneous relational data. My work develops methods for inference across multiple graphs, entity alignment, and joint network embeddings, with applications to neuroscience, social platforms, security incident networks, and large-scale structured datasets. I am particularly interested in applying causal machine learning and multi-layer network methods to socio-economic, institutional, ownership, and political-business networks, including problems of data integration, record linkage, and rule-of-law measurement.

Education

2019 – 2022: Ph.D. in Mathematics
University of Maryland, College Park, USA
Dissertation: Statistical Inference across Multiple Graphs: Advancements in Multiplex Graph Matching and Joint Spectral Graph Embeddings.
Advisor: Professor Vince Lyzinski.
Research areas: statistical network analysis, graph matching, multiple-network inference, network embeddings, brain networks, social networks.

2017 – 2019: Ph.D. in Mathematics. Transferred to University of Maryland following advisor relocation.
University of Massachusetts, Amherst, USA

2011 – 2016: B.Sc. in Applied Mathematics
National and Kapodistrian University of Athens, Greece

Publications and Preprints

Academic Publications

Optimizing the Induced Correlation in Omnibus Joint Graph Embeddings.
***Konstantinos Pantazis**, Michael Trosset, William N. Frost, Carey E. Priebe, and Vince Lyzinski. Journal of Computational and Graphical Statistics, accepted for publication, 2026.*

Clustered Graph Matching for Label Recovery and Graph Classification.
*Zhirui Li, Jesús Arroyo, **Konstantinos Pantazis**, and Vince Lyzinski. IEEE Transactions on Network Science and Engineering, 10(6):3384–3395, 2023.*

The Importance of Being Correlated: Implications of Dependence in Joint Spectral Inference across Multiple Networks.
***Konstantinos Pantazis**, Avanti Athreya, Jesús Arroyo, William N. Frost, Evan S. Hill, and Vince Lyzinski. Journal of Machine Learning Research, 23(141):1–77, 2022.*

Multiplex Graph Matching Matched Filters.
***Konstantinos Pantazis**, Daniel L. Sussman, Youngser Park, Zhirui Li, Carey E. Priebe, and Vince Lyzinski. Applied Network Science, 7, Article 29, 2022.*

Industry Publications

Hybrid multi-physics and machine-learning framework for prediction and optimization in twin-screw food extrusion
*Eleftherios Tsivolas, **Konstantinos Pantazis**, Dimitrios Sfondylis, Marina Kontou, and Ilias Tagkopoulos. Journal of Food Engineering, under review, 2026.*

Professional and Research Experience

Sept. 2024 – Present: Data Scientist

Deus Ex Machina / PIPA AI, Athens, Greece / Remote

- Designed evaluation and verification workflows for LLM-based biomedical information extraction, improving measured system accuracy from below 80% to 93%.
- Built end-to-end machine-learning pipelines for heterogeneous scientific datasets, including BioBERT-based featurization, regression/classification modeling, feature selection, active learning, and automated retraining.
- Integrated heterogeneous data sources using REST APIs, web scraping, public databases, and relational databases, with emphasis on data standardization and reproducible downstream analysis.
- Implemented and evaluated retrieval-augmented and graph-based retrieval systems using RAGAS, TruLens, and modern LLM frameworks.

June 2022 – June 2023: Postdoctoral Fellow, Applied Mathematics & Statistics

Johns Hopkins University, Baltimore, USA

- Investigated the effects of preprocessing non-network data into time series of networks for neuroscience applications using R.
- Studied relationships between network embeddings and classical statistical techniques such as principal component analysis.
- Developed statistical analyses for network-valued data, with emphasis on inference, embeddings, and downstream learning tasks.
- Faculty sponsor: Professor Carey Priebe.

May 2022 – Aug. 2022: Joint E+D & MSR Research Intern

Microsoft, Seattle, USA

- Modeled security incidents via graphs and applied graph-similarity learning methods toward building interactive systems.
- Preprocessed network-streaming security data and implemented deep graph-similarity learning methods, including SimGNN.
- Built interactive Power BI dashboards for large collections of security incidents, supporting risk quantification and relational analysis.
- Supervisors: Dr. Anna Bertinger and Dr. Jonathan Larson.

June 2021 – Aug. 2021: Machine Learning Intern

Computational and Information Sciences Directorate, DEVCOM Army Research Laboratory, Washington, DC, USA

- Surveyed recommender-system research and proposed a collaborative filtering algorithm for prioritizing information objects in dynamic settings.
- Supervisor: Dr. Jade Freeman.

Sept. 2018 – Aug. 2019: Research Assistant

University of Massachusetts, Amherst, USA

- Worked on graph matching problems under the supervision of Professor Vince Lyzinski.

Selected Research Projects

Joint Spectral Inference across Multiple Networks

- Studied dependence structures in joint network embeddings and quantified their implications for clustering, classification, and effective sample size.
- Developed methodology for analyzing and optimizing induced dependence in omnibus joint graph embeddings.
- Applied joint embedding methodology to detect subtle neuronal stimulus responses in *Aplysia californica* brain recordings.

Multiplex Graph Matching and Network Alignment

- Designed graph-matching methods for linking entities across multiple networks, including YouTube, Twitter, and FriendFeed data.
- Developed optimization methods for knowledge-graph signal recovery and multi-platform user linkage.

Graph Matching for Human Connectomes

- Developed graph-matching methodology for human connectome data with rigorous out-of-sample vali-

dation.
- Achieved high matching accuracy on HNU1 connectome data.

Selected Talks and Presentations

CMStatistics 2022: 15th International Conference of the ERCIM WG on Computational and Methodological Statistics.
Virtual, December 17–19, 2022. [Slides]

NeurIPS 2022: Thirty-sixth Conference on Neural Information Processing Systems.
In-person poster session, November 28–December 1, 2022. [Poster]

Invited Talk at National and Kapodistrian University of Athens.
In-person, December 10, 2021.

2021 Joint Statistical Meetings.
Virtual presentation, August 2021.

DEVCOM–ARL Summer Student Symposium.
Virtual poster presentation, August 12, 2021. [Poster]

NETWORKS 2021: A Joint Sunbelt and NetSci Conference.
Virtual talk, July 2021.

Teaching Experience

Course Instructor, Johns Hopkins University
- Introduction to Optimization (EN.553.361), Spring 2023.
- Probability and Statistics for the Biological Sciences and Engineering (EN.553.311), Fall 2022.

Teaching Assistant, University of Maryland, College Park
- Introduction to Linear Algebra (MATH240), Spring 2022.
- Applied Probability and Statistics (STAT400), Spring 2020 and Spring 2021.
- Linear Algebra for Scientists and Engineers (MATH461), Fall 2019.
- Graded graduate and undergraduate mathematics courses, including Real Analysis and Applied Harmonic Analysis.

Teaching Assistant, University of Massachusetts, Amherst
- Ordinary Differential Equations (MATH331), Fall 2017.

Technical Skills

Programming: Python, R, SQL, MATLAB, LaTeX.
Network Science: graph matching, multiplex networks, network alignment, joint spectral embeddings, graph similarity learning, NetworkX.
Machine Learning: scikit-learn, PyTorch, TensorFlow, BioBERT, active learning, model evaluation.
Data Integration: REST APIs, web scraping, relational databases, entity standardization, record linkage, heterogeneous data pipelines.
LLMs and Text Mining: RAG, graph-based retrieval, LangChain, RAGAS, TruLens, information extraction.

Reviewing and Service

Reviewer
- Journal of Machine Learning Research.
- Knowledge-Based Systems.

Awards, Fellowships, and Scholarships

2021 – 2022: IMS Hannan Graduate Student Travel Award
Institute of Mathematical Statistics, $750.

Fall 2019 – Spring 2021: Dean's Fellowship
University of Maryland, College Park, $10,000.

Spring 2020: Gerondelis Foundation Inc. Scholarship
$5,000.

August 2017: UMass Fellowship
University of Massachusetts, Amherst, $500.

Fall 2016 – Spring 2017: University of Athens Fellowship
Awarded as a top-three first-year Master's student in the Applied Mathematics program, $1,000.

Volunteering and Community Engagement

2020-Present: Blood and Platelet Donor
Greece / American Red Cross, USA
Regular donor supporting patients and public health needs.

2021 – 2022: Probationary / Associate Member
Hyattsville Volunteer Fire Department, Inc., Hyattsville, Maryland, USA
Served as a probationary / associate member of a volunteer emergency-services organization.

Languages
Greek: Native
English: Full professional proficiency
German: A2 (actively learning)