

BIOGRAPHICAL

Name: Sofia Triantafyllou
Email address: sof.triantafyllou@gmail.com
URL: <https://sites.google.com/view/softriant>
Google Scholar: <https://scholar.google.com/citations?user=n6-8SZ4AAAAJ&hl=en>

CURRENT RESEARCH INTERESTS:

Developing algorithms for causal discovery and inference. Developing methods for integration of multiple data sources from different experimental conditions or modalities. Applying machine learning and causal inference methods to solve problems in biology and medicine.

EDUCATION and TRAINING

UNDERGRADUATE:

2001-2007	National Technical University of Athens Athens, Greece	Diploma 2007	Applied Mathematics and Physics
-----------	---	-----------------	------------------------------------

GRADUATE:

2007-2010	University of Crete Crete, Greece	MS 2010	Computer Science Advisor: Ioannis (Yanni) Tollis
2010-2015	University of Crete Crete, Greece	PhD 2015	Computer Science Advisor: Ioannis Tsamardinos

POSTGRADUATE:

2015 – 2016	University of Crete Crete, Greece	Post-doctoral Research Fellow	Computer Science Advisor: Ioannis Tsamardinos
2016 – 2017	Rehabilitation Institute of Chicago Northwestern University Feinberg School of Medicine Chicago, IL	Post-doctoral Research Fellow	Advisor: Konrad P. Kording
2017 – 2018	University of Pennsylvania Philadelphia, PA	Post-doctoral Research Fellow	Biomedical Engineering Advisor: Konrad P. Kording

APPOINTMENTS and POSITIONS

ACADEMIC:

2021 – now	Department of Mathematics and Applied Mathematics School of Sciences and Engineering University of Crete, Greece	Assistant Professor
------------	--	---------------------

2018 – 2021	Department of Biomedical Informatics University of Pittsburgh Pittsburgh, PA	Assistant Professor
-------------	--	---------------------

NON-ACADEMIC:

2015	Gnosis Data Analysis Heraklion, Greece	Contractor
------	---	------------

MEMBERSHIP in PROFESSIONAL and SCIENTIFIC SOCIETIES

2008-now	Member, Hellenic Society of Artificial Intelligence
2020-now	Member, Association for the Advancement of Artificial Intelligence (AAAI)

HONORS

2007 – 2010	Scholarship for MSc students, Institute of Computer Science, Foundation for Research and Technology, Hellas, Greece
2010 – 2015	Scholarship for PhD candidates, Institute of Computer Science, Foundation for Research and Technology, Hellas, Greece
2012	Best Poster Presentation, 7 th HSCBB Conference, Hellenic Society for Computational Biology and Bioinformatics

PUBLICATIONS

Refereed articles

1. Tsiaras V, **Triantafillou S**, Tollis IG. Dagmaps Space filling visualization of directed acyclic graphs Journal of Graph Algorithms and Applications 2009;13(3):319–347.
2. Tsamardinos I, **Triantafillou S**. The possibility of integrative causal analysis: learning from different datasets and studies. Journal of Engineering Intelligent Systems 2011;17(2/3):163-175.
3. Tsamardinos I, **Triantafillou S**, Lagani V. Towards integrative causal analysis of heterogeneous data sets and studies. The Journal of Machine Learning Research 2012;13(1):1097-1157.
4. **Triantafillou S**, Tsamardinos I. Constraint-based causal discovery from multiple interventions over overlapping variable sets. Journal of Machine Learning Research 2015;16:2147-2205.
5. **Triantafillou S**, Lagani V, Heinze-Deml C, Schmidt A, Tegner J, Tsamardinos I. Predicting Causal Relationships from Biological Data: Applying Automated Causal Discovery on Mass Cytometry Data of Human Immune Cells. Scientific Reports 2017;7(1):12724. doi: 10.1038/s41598-017-08582-x. PMID: 28983114.
6. Tsirlis K, Lagani V, **Triantafillou S**, Tsamardinos. On scoring maximal ancestral graphs with the max-min hill climbing algorithm. International Journal of Advanced Research 2018;102:74-85.

7. **Triantafillou S**, Saeb S, Lattie EG, Mohr D, Kording KP. The relationships between sleep quality and mood in ecological momentary assessment. *Journal of Medical Internet Research*, 2019.
8. Stingone JA, **Triantafillou S**, Larsen A, Kitt JP, Shaw GM, Marsillach J. Interdisciplinary data science to advance environmental health research and improve birth outcomes. *Environmental Research*, 2021.

Book chapters

1. Lagani V*, **Triantafillou S***, Ball G*, Tegner J, Tsamardinos. Probabilistic Computational Causal Discovery for Systems Biology. In: Geris L, Gomez-Cabrero D (Eds.). *Uncertainty in Biology A Computational Modeling Approach*. Springer. 2016, pp 33-73 (*equal contribution).

Conference proceedings

1. Tsiaras V, **Triantafillou S**, Tollis IG. Treemaps for directed acyclic graphs. In: *Proceedings of the 15th International Symposium on Graph Drawing*. 2007, pp 377-388.
2. Avguleas I, Gkirtzou K, **Triantafillou S**, Bikakis A, Antoniou G, Kontopoulos E, Bassiliades N. Visualization of proofs in defeasible logic. In: *Proceedings of the International RuleML Symposium on Rule Interchange and Applications*. 2008, pp 197-210.
3. **Triantafillou S**, Tsamardinos I, Tollis IG. Learning causal structure from overlapping variable sets. In: *Proceedings of the 13th International Conference on Artificial Intelligence and Statistics*. 2010, pp86-867.
4. Borboudakis G, **Triantafillou S**, Lagani V, Tsamardinos I. A constraint-based approach to incorporate prior knowledge in causal models. In: *Proceedings of the 19th European Symposium on Artificial Neural Networks*. 2011.
5. Lagani V, Tsamardinos, **Triantafillou S**. Learning from mixture of experimental data: a constraint-based approach. In: *Proceeding of the 7th Hellenic Conference on Artificial Intelligence*. 2012.
6. Borboudakis G, **Triantafillou S**, Tsamardinos I. Tolls and algorithms for causally interpreting directed edges in maximal ancestral graphs. In: *Proceedings of the 6th European Workshop on Probabilistic Graphical Models*. 2012.
7. **Triantafillou S**, Tsamardinos I, Roumpelaki A. Finding neighborhoods of high confidence in constraint-based causal discovery. In: *Proceedings of the 7th European Workshop on Probabilistic Graphical Models*. 2014, pp 487-502.
8. Roumpelaki A, Borboudakis G, **Triantafillou S**, Tsamardinos I. Marginal consistency in constraint-based causal learning. In: *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI), Causation" Foundation to Application Workshop*. 2016.
9. **Triantafillou S**, Tsamardinos I. Score-based vs constraint-based causal learning in the presence of confounders. In: *Proceedings of the Conference on Uncertainty in Artificial Intelligence (UAI), Causation" Foundation to Application Workshop*. 2016.
10. Athineou G, Papoutsoglou G, **Triantafillou S**, Basdekis I, Lagani V, Tsamardinos I. SCENERY: A web-based application for network reconstruction and visualization of cytometry data. *10th International Conference on Practical Applications of Computational Biology & Bioinformatics*. 2016.
11. Tsirlis K, Lagani V, **Triantafillou S**, Tsamardinos I. On scoring maximal ancestral graphs with the max-min hill climbing algorithm. *KDD Workshop on Causal Discovery*. 2017.

12. Arani E, **Triantafillou S**, Kording KP. Reverse engineering neural networks from many partial recordings. Conference on Cognitive Computational Neuroscience (CNN). 2018.
13. Biza K, Tsamardinos I, **Triantafillou S**. Tuning Causal Discovery Algorithms, Proceedings of the Tenth International Conference on Probabilistic Graphical Models, in Proceedings of Machine Learning Research, 2020
14. **Triantafillou S**, Cooper GF, Learning Adjustment Sets from Observational and Limited Experimental Data, Proceedings of the 35th AAAI Conference of Artificial Intelligence, 2021.
15. **Triantafillou S**, Jabbari F, Cooper G, Causal and Interventional Markov Boundaries, Proceedings of the 37th Conference on Uncertainty in Artificial Intelligence, 2021.
16. Singla S, Wallace S, **Triantafillou S**, Batmanghelich K. Using Causal Analysis for Conceptual Deep Learning Explanation. arXiv preprint arXiv:2107.06098, 2021.

Preprints

1. Marinescu IE, **Triantafillou S**, Kording K, Regression Discontinuity Threshold Optimization, SSRN preprint: 3333334 (2019)

Other publications

1. **Triantafillou S**, Tsamardinos I. Predicting associations from multiple “omics” data sets. 7th Conference of the Hellenic Society for Computational Biology and Bioinformatics. 2012. (Poster)

PROFESSIONAL ACTIVITIES

TEACHING

Instructor

2021	Parametric Statistics (full semester course), Fall Semester.
2020	Causal Discovery and Inference Module (4 lectures, 1 homework), Foundations of Bioinformatics, DBMI training program, Spring Semester.
2007 – 2015	Teaching Assistant in the following courses: <ul style="list-style-type: none"> ● Data Structures ● Algorithms and Complexity ● Machine Learning ● Algorithms in Bioinformatics ● Linear Algebra ● Introduction to Bioinformatics Algorithms

Duties involved preparation of course material (lecture slides, homework assignments), grading, lecturing.

RESEARCH

2021 -now	<p>1R01GM141081-01 <u>Precision Medicine Approach to Glucocorticosteroids in Sepsis</u></p> <p>This project develops personalized treatment predictions for the use of Glucocorticoids in sepsis patients. I am responsible for combining observational (EHR) and experimental (RCT) data to improve prediction accuracy.</p> <p>Principal Investigators: Yende, Angus</p>
-----------	--

Role: Co-Investigator

- 2017 -2018 U01NS094248 Massive scale electrical neural recordings in vivo using commercial ROIC chips
This collaborative brain initiative grant develops technology to use existing infrared imaging chips to enable very large scale electrical recordings and to develop the techniques to analyze such data. I am responsible for designing methods for causal inference from massive scale recordings.
Principal Investigators: Kording, Schaefer
Role: Postdoctoral Fellow
- 2016-2017 R01MH103910 Big Data for Better Health (BD4BH) in Pennsylvania
This collaborative transformative R01 develops technology to record neural activities onto DNA, allowing offline extraction of neural activity information promising super-large scale recordings. I am responsible for the computational analysis of the recordings data.
Principal Investigators: Kording, Boyden, Church
Role: Postdoctoral Fellow
- 2012 – 2015 STATegra: User-driven Development of Statistical Methods for Experimental Planning, Data Gathering, and Integrative Analysis of Next Generation Sequencing, Proteomics, and Metabolomics Data (EU Specific Targeted Research Projects)
Principal Investigator: Ana Conesa
Duties: Develop methods for integrative causal analysis of public data sets
- 2015 – 2016 CAUSALPATH: Next Generation Causal Analysis: Inspired by the Induction of Biological Pathways from Cytometry Data (ERC Consolidator Grant)
Principal Investigator: Ioannis Tsamardinos
Duties: Develop algorithms for robust causal learning from single or multiple data sets measuring the same system under study
Evaluate causal discovery methods on a collection of 40,000 public mass cytometry data sets
Project management (organize monthly meetings, keep track of all participants' progress, archive progress and scientific results)

Seminar and invited talks

- 2009 Tsamardinos I, Triantafillou S. Introduction to causal discovery: A Bayesian network approach.
Hellenic Artificial Intelligence Summer School, International Hellenic University
- 2010 Tsamardinos I, Triantafillou S. Introduction to causal discovery: A Bayesian network approach.
6th Hellenic Conference on Artificial Intelligence (SETN)
- 2011 Tsamardinos I, Triantafillou S. Introduction to causal discovery: A Bayesian network approach.
The 14th IASTEN International Conference on Artificial Intelligence and Soft Computing (ASC)
- 2011 Tsamardinos I, Triantafillou S. Introduction to causal discovery: A Bayesian network approach.
European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD)
- 2012 Tsamardinos I, Triantafillou S Lagani V. Introduction to causal discovery: A Bayesian network approach.
High-Throughput Omics & Data Integration Workshop (COST)
- 2014 Tsamardinos I, Triantafillou S, Lagani V, Roumpelaki A. Advances in integrative causal analysis and connections to statistical matching. Session: Bayesian Networks in Official Statistics

ERCIM WG on Computational and Methodological Statistics

- 2016 Triantafillou S, Tsamardinos I. Tutorial: Logic-based integrative causal discovery
Uncertainty in Artificial Intelligence (UAI)
- 2020 Cooper, G and Triantafillou, S. Estimating causal effects from observational and limited experimental data
using graphical models Modeling @ Alphabet Talk Series

Other research related activities

Editorial Board:

- 2018-now Neurons, Behavior, Data analysis, and Theory
2020-now Journal of Machine Learning Research

Journal Reviewer:

- 2013 External Reviewer, Journal of Discrete Algorithms
2015 External Reviewer, Journal of Machine Learning Research
2015 External Reviewer, Journal of Approximate Reasoning
2016 External Reviewer, Journal of Data Science and Analytics
2017 External Reviewer, Journal of Data Science and Analytics
2017 External Reviewer, Synthese
2018 External Reviewer, Journal of Data Science and Analytics
2019 External Reviewer, Journal of Approximate Reasoning
2020 External Reviewer, Journal of Machine Learning Research
2020 External Reviewer, Journal of Biomedical Informatics
2020 External Reviewer, Journal of Artificial Intelligence
2021 External Reviewer, Journal of Machine Learning Research
2021 External Reviewer, Machine Learning
2021 External Reviewer, Journal of Artificial Intelligence

Conference Reviewer:

- 2010 International Conference on Artificial Neural Networks
2012 7th Hellenic Conference on Artificial Intelligence (SETN 2012)
2014 Statistical Methods for Omics Data Integration and Analysis
2015 Statistical Methods for Omics Data Integration and Analysis
2015 Conference on Uncertainty in Artificial Intelligence (UAI)
2016 Conference on Uncertainty in Artificial Intelligence (UAI)
2016 Conference on Knowledge Discovery and Data Mining (KDD2016)
2017 Conference on Knowledge Discovery and Data Mining (KDD2017)
2018 Conference on Knowledge Discovery and Data Mining (KDD2018)
2019 Conference on Knowledge Discovery and Data Mining (KDD2019)
2019 AAAI Conference on Artificial Intelligence (AAAI 2019)
2020 Conference on Learning Theory (COLT 2020)
2020 NeurIPS Workshop on Causal Discovery and Causality-Inspired Machine Learning
2020 ACM SIGKDD Workshop on Causal Discovery (CD 2020)
2021 International Joint Conference on Artificial Intelligence (IJCAI 2021)
2021 European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in
Databases (ECML-PKDD 2021)
2021 NeurIPS Workshop on Causality

SERVICE:

University and Medical School

2019 – 2021	Core Faculty, Biomedical Informatics Training Program, University of Pittsburgh
2020 – 2021	Secondary Appointment, Intelligent Systems Program, University of Pittsburgh
2020 – 2021	Secondary Appointment, Joint PhD program on Computational Biology