HANS MATTHEW RIESS

Contact

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Summary

I am an engineer with training in theoretical mathematics working in academia. I possess strong skills in writing, coding, communication, and leadership. My research interests include networked autonomous systems, geometric deep learning, lattice theory and applied topology.

Appointments

Duke University Durham, NC

Postdoctoral Associate November 2022 –

I lead efforts in the development of new theories, algorithms, and software for the analysis of networked autonomous systems, including the development of relevant data-driven and machine learning techniques. I interact with and supervise graduate and undergraduate students in our group working on relevant research topics.

Education

University of Pennsylvania Philadelphia, Pennsylvania

Doctoral Candidate in Electrical and Systems Engineering

August 2017 – December 2022

Adviser: Robert Ghrist

Thesis: "Lattices in Multi-Agent Systems"

Duke University Durham, North Carolina

Bachelors of Science in Mathematics
August 2013 – May 2016

Awards and Fellowships

Leggett Family Endowed Fellowship, University of Pennsylvania, 2018

Ganster Fellowship, University of Pennsylvania, 2017

Journal Publications

Claudio Battiloro, Zhiyang Wang, **Hans Riess**, Paolo Di Lorenzo, & Alejandro Ribeiro (2023). "Tangent Bundle Convolutional Learning: from Manifolds to Cellular Sheaves and Back." Submitted.

Mikhail Hayhoe, **Hans Riess**, Victor Preciado, & Alejandro Ribeiro (2022). "Stable and Transferable Hyper-Graph Neural Networks." Submitted.

Robert Ghrist and **Hans Riess** (2021). "Cellular Sheaves of Lattices and the Tarski Laplacian." *Journal of Homology, Homotopy, and Applications*.

M. Cantanzaro, J. Curry, B. Fasy, J. Lazovskis, G. Malen, **Hans Riess**, B. Wei, & M. Zabka (2020). "Moduli Spaces of Morse Functions for Persistence." *Journal of Applied and Computational Topology.*

Conference Proceedings

Hans Riess, Michael Munger, & Michael Zavlanos (2023). "Max-Plus Synchronization in Decentralized Trading Systems." Submitted.

Claudio Battiloro, Zhiyang Wang, **Hans Riess**, Paolo Di Lorenzo, & Alejandro Ribeiro (2022)."Tangent Bundle Filters and Neural Networks: from Manifolds to Cellular Sheaves and Back." To appear in proceedings of *2023 IEEE International Conference on Acoustics Speech and Signal Processing*.

Hans Riess & Robert Ghrist (2022). "Diffusion of Information on Networked Lattices by Gossip." Proceedings of *2022 IEEE Conference on Control & Decision Systems*.

Hans Riess, Yiannis Kantaros, George Pappas, & Robert Ghrist (2020). "A Temporal Logic-Based Hierarchical Network Connectivity Controller." Proceedings of *2021 SIAM Control Theory Conference*.

Hans Riess & Jakob Hansen (2020). "Multidimensional Persistence Module Classification via Lattice-theoretic Convolution." *NeurIPS: Topological Data Analysis and Beyond.*

Alejandro Parada-Mayorga, **Hans Riess**, Alejandro Ribeiro, & Robert Ghrist (2020). "Quiver Signal Processing." Submitted.

Invited Talks

The Tarski Laplacian and Beyond, University of Florida Topological Data Analysis Conference, February 2023

Lattice Theory in Social Choice and Multi-Agent Systems, Applications of Hodge Theory on Networks, Banff International Research Station for Mathematical Innovation and Discovery (BIRS), February 2023

Towards Geometry of Lattice-Valued Sheaves, TGDA Seminar, Ohio State University, November 2022

Lattice-Valued Network Sheaves, Conference on Applied, Combinatorial and Toric Topology, July 2022

A Sheaf Laplacian for Lattice-Valued Sheaves, CIMAT Applied Geometry and Topology Seminar, June 2022

Cellular Sheaves of Lattices and the Tarski Laplacian, Joint Mathematics Meeting, AMS Special Session on Statistics and Machine Learning Using Topology and Geometry, April 2022

Lattice Theory in Multi-Agent Systems, Workshop on Algebraic Combinatorics and Category Theory in Topological Data Analysis, March 2022

Network Sheaves Valued in Categories of Adjunctions, Applied Category Theory Conference, July 2021

A Lattice-theoretic Laplacian for Cellular Sheaves, SIAM Computational Science and Engineering Conference, March 2021

Tarski Sheaves, Applied Topology in Albany Seminar, February 2021

Cellular Sheaves and the Tarski Laplacian, to Quantum Group at University of Oxford, Department of Computer Science, July 2020

Cellular Sheaves and the Tarski Laplacian, SIAM Mathematics of Data Science Conference, May 2020

Teaching

Teaching Assistant to Robert Ghrist, *Video Production for Mathematics*, Fall 2021

Teaching Assistant to Santosh Venkatesh, *Introduction to Probability and Statistics*, Summer 2018

Academic Service

Review, *SIAM Journal of Applied and Geometry*

Review, *IEEE Transactions on Automatic Control*

Review, *NeurIPS Workshop*, 2020

Organizer, *GRASP Lab Game Theory Seminar*, Summer 2020

Organizer, *Graduate Research Seminar in Applied Topology*, July 2018 – July 2019

Volunteer, *Duke Alumni Admissions Advisory Committee (AAAC)*, January 2018 –

References

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Alejandro Ribeiro
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University of Pennsylvania
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