

Maosheng Yang

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PERSONAL PROFILE

I enjoy and appreciate the opportunity of doing research. Over the years, I have developed *signal processing and machine learning methods mainly on simplicial complexes for flow-type data* in networks. My current research interests include: learning on geometry and topology domains, physics-based learning, statistical learning, generative models, as well as application topics for physics problems, climate science and so on.

EDUCATION

Delft University of Technology <i>Ph.D. candidate; Dept. Intelligent Systems; Advisor: Elvin Isufi, Geert Leus</i>	Aug. 2025
Delft University of Technology <i>M.Sc. (Cum laude); Electrical Engineering, Advisor: Mario Coutiño, Elvin Isufi, Geert Leus</i>	Aug. 2020 GPA: 9+/10
Beijing Jiaotong University <i>B.Sc.; Electrical Engineering</i>	June. 2018 GPA: 93/100

RESEARCH PUBLICATIONS

Hodge-compositional Edge Gaussian Processes | [paper](#), [code](#) | Artificial Intelligence and Statistics (AISTATS), 2024

- **Maosheng Yang**, Viacheslav Borovitskiy, Elvin Isufi.
- Built principled Gaussian processes on simplicial complexes based on *combinatorial Hodge theory*
- Applied the proposed method in Foreign Currency Exchange, Ocean Currents and Water Supply Networks

Convolutional Learning on Simplicial Complexes | [paper](#), [code](#) | Preprint, 2023

- **Maosheng Yang**, Elvin Isufi.
- Proposed a general convolutional learning framework for data in simplicial complexes, including node data, edge flows, triangle data and so on
- Theoretical analysis of the framework, including locality and symmetry, spectral analysis based on Hodge decomposition and stability analysis
- Applied in currency exchange, triangle and tetrahedron predictions, and trajectory prediction
- Implemented our model in the open source module [TopoModelX](#) for topological deep learning.

Online Edge Flow Prediction Over Expanding Simplicial Complexes | [paper](#) | ICASSP, 2023

- **Maosheng Yang**, Bishwadeep Das, Elvin Isuf.
- Designed algorithms for predicting edge flows when the underlying topology is growing.

Simplicial Convolutional Filters | [paper](#) | IEEE Transactions on Signal Processing, 2022

- **Maosheng Yang**, Elvin Isufi, Michael T. Schaub, Geert Leus.
- Proposed spectral methods for signals defined on simplicial complexes, based on discrete calculus
- Built the convolutional filters for simplicial complexes based on the Hodge decomposition
- Chebyshev polynomial filter implementation

Simplicial Trend Filtering | [paper](#) | Asilomar, 2022

- **Maosheng Yang**, Elvin Isufi.
- Proposed trend filtering methods for edge flows on simplicial complexes

Convolutional Filtering in Simplicial Complexes | [paper](#) | ICASSP, 2022

- **Maosheng Yang**, Elvin Isufi.
- Joint convolutional filters for signals on simplices of different orders, e.g., node signal, edge flow, triangle signal

Simplicial Convolutional Neural Networks | [paper](#), [code](#) | ICASSP, 2022

- **Maosheng Yang**, Elvin Isufi and Geert Leus.
- Designed a neural network based on simplicial convolutional filters for learning from data on simplices of one certain order, e.g., edge flows, which returns to graph convolutional neural networks for node data
- Implemented the proposed model in the open source module [TopoModelX](#)

Finite Impulse Response Filters for Simplicial Complexes | [paper](#) | EUSIPCO, 2021

- **Maosheng Yang**, Elvin Isufi, Michael T. Schaub, Geert Leus.

- Early work on filtering data on simplices of one certain order (several neural network papers perform convolutions based on this method)

Topological Volterra Filters | [paper](#) | ICASSP, 2021

- Geert Leus, **Maosheng Yang**, Mario Coutino, Elvin Isufi.

Node-Adaptive Regularization for Graph Signal Reconstruction | [paper](#) | IEEE OJSP, 2021

- **Maosheng Yang**, Mario Coutino, Geert Leus, Elvin Isufi.

Node varying regularization for graph signals | [paper](#) | EUSIPCO, 2020

- **Maosheng Yang**, Mario Coutino, Geert Leus, Elvin Isufi.

ACADEMIC WORK

Participation in the open source project TopoModelX | [software paper](#)

July 2023

TopoModelX is a Python module for topological deep learning, where two models in our papers were implemented.

Check the related overview [paper 1](#) and [paper 2](#).

Reviewer for signal processing and machine learning journals and conferences

Reviewed for journals: IEEE TSP, TSIPN, SPL, TNNLS and conferences: ICASSP, EUSIPCO, SampTA, ICML, NeurIPS.

Co-authored a tutorial book on machine learning on graphs

Used as materials for two master courses in TU Delft

Bachelor and master graduation project supervision

2022 – present

Supervised two projects involving ten bachelor students on topics of recommender systems and deep neural networks, one master project on topological unrolling networks

Talks and Workshops

- DeepK – workshop on deep learning and kernel machines, (Mar 2024, oral presentation)
- Talk on *Simplicial Convolutions* in AMLab, Amsterdam (Feb 2024)
- Learning on graphs, Amsterdam (Nov 2023); ICASSP (June 2023)
- Workshop on Machine learning and signal processing on graphs, CIRM, France (Nov 2022)

OTHERS

AWARDS

Master study scholarship

2018 – 2020

Faculty scholarship by Microelectronics department of TU Delft (total amount of 50,000 euros)

Academic Excellence Scholarship in Beijing Jiaotong University

2015 – 2018

SKILLS

Languages: Python, Matlab, Julia (beginner), \LaTeX

Tools: PyTorch, Jax, Git/GitHub, scikit-learn, chebfun, Gudhi, etc

HOBBIES

Cycling, bouldering, movies, gaming, museums