

Woojin Kim

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CONTACT INFORMATION

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RESEARCH INTEREST

Theoretical foundations of topological data analysis, applied topology, computational topology, metric geometry, and their applications to dynamical systems.

EDUCATION

The Ohio State University, OH

- Ph.D. Mathematics, August 2014 - May 2020 (expected)
 - Dissertation topic: Enriched Persistence Theory for Dynamic Topology
 - Advisor: Facundo Mémoli
- M.S. Mathematics, August 2017

Seoul National University, South Korea

- B.S. Mathematics Education, August 2014 (with Honors)
- Korean National Secondary Teacher Certificate in Math

AWARDS

Special Graduate Assignments for 2 semesters Spring 2018, 2020
Departmental fellowship (exemption from teaching duty)

Travel Grants for 9 conference attendances

U of Florida (2020), AMS (2020), Brown (2019), U of Chicago (2019), U of Michigan (2019), Kyoto Univ (2019), U of Minnesota (2018), U of Bonn (2018), Carnegie Mellon (2017)

PAPERS

1. **Elder-rule-staircodes for augmented metric spaces**, with C.Chen, F. Mémoli, Y. Wang, Submitted in December 2019.
2. **The metric structure of the formigram interleaving distance**, with F. Mémoli, A. Stefanou, Preprint on [arXiv/1912.04366](https://arxiv.org/abs/1912.04366) (26 pages).
3. **Spatio-temporal persistent homology for dynamic metric spaces**, with F. Mémoli, To appear in Discrete & Computational Geometry, Preprint on [arXiv/1812.00949](https://arxiv.org/abs/1812.00949) (45 pages).
4. **Generalized persistence diagrams for persistence modules over posets**, with F. Mémoli, Preprint on [arXiv/1810.11517](https://arxiv.org/abs/1810.11517) (51 pages), Submitted.
5. **Formigrams: Clustering summaries of dynamic data**, with F. Mémoli, In Proceedings of 30th Canadian Conference on Computational Geometry (2018), 180-188. **Article.**
6. **Stable signatures for dynamic graphs and dynamic metric spaces via zigzag persistence**, with F. Mémoli, Preprint on [arXiv/1712.04064](https://arxiv.org/abs/1712.04064) (58 pages), Submitted.
7. **Stable signatures for dynamic metric spaces via persistent homology**, with F. Mémoli, Oberwolfach Report, 3 (2018), 169-172. **Article.**
8. **Analysis of dynamic graphs and dynamic metric spaces via zigzag persistence**, with F. Mémoli, Z. Smith, To appear in Abel symposia 2019 (18 pages).

EXPOSITORY WEBPAGE

<https://research.math.osu.edu/networks/formigrams/>

* * *Invited talks* * *

- Generalized persistence diagrams for persistence modules over posets** January 2020
The University of Florida Topological Data Analysis meeting
- Spatio-temporal persistent homology for dynamic metric spaces** January 2020
Special Session on Applied Topology,
The Joint Mathematics Meetings 2020 in Denver, Colorado
- Generalized persistence diagrams for persistence modules over posets** October 2019
Topology seminar at Colorado State
- Spatio-temporal persistent homology for dynamic metric spaces** September 2019
Applied Topology seminar, University at Albany, SUNY
- Topological data analysis of time-evolving metric data** July 2019
Air Force Research Lab in Dayton, Ohio
- Multiparameter persistent homology for time-varying metric data** April 2019
Brown-bag seminar at the Dept of Computational Mathematics, Science,
and Engineering, Michigan State
- Rank invariant and generalized persistence diagrams for zigzag persistence** March 2019
Bubenik's research group meeting at University of Florida
- Persistent homology for time-evolving metric/network data** March 2019
Topology seminar at Florida State
- Stable signatures for dynamic metric spaces via zigzag persistent homology** March 2018
AMS Spring Central Sectional Meeting at Ohio State
- Topological and geometric ideas in data analysis** July 2016
Dept of Math Education, Seoul National University
- * * *Contributed talks* * *
- Generalized persistence diagrams for persistence modules over posets** September 2019
Applied Topology Session, Union College Math Conference
- Generalized persistence diagrams for persistence modules over posets** September 2019
Topology, Geometry and Data Analysis seminar at OSU
- Multiparameter persistent homology for time-varying metric data** April 2019
Great Lake SIAM 2019 at University of Michigan
- Rank of a diagram and its application in topological data analysis** April 2019
Mathematics Graduate Student Association Lecture at OSU
- Multiparameter persistent homology for time-varying metric data** February 2019
Topology, Geometry, and Applications - Graduate Students Seminar at OSU
- Formigrams: Clustering summaries of dynamic data** August 2018
The 30th Canadian Conference on Computational Geometry,
University of Manitoba, Canada

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	Rank for arbitrary diagrams Topology, Geometry, and Applications - Graduate Students Seminar at OSU	November 2018
	Talks in Mémoli's group seminars or course work More than 30 research or expository talks about topological data analysis, networks, optimal transport, probability, and differential/metric geometry. Links: 1 , 2 , 3 , 4 , 5 , 6	2015 - 2019
POSTER PRESENTATIONS	Persistent homology for dynamic metric spaces The 1st Midwest Student Conference: Geometry and Topology meet Data Analysis and Machine Learning	June 2019
	Persistent homology for dynamic metric spaces TGDA@OSU: Structure in the micro-world	May 2019
	Persistent homology for dynamic metric spaces Geometric Data Analysis at University of Chicago	May 2019
	Rank invariant for zigzag modules Workshop on Applied Topology at Kyoto Univ	January 2019
TEACHING EXPERIENCE	Calculus for Engineers A , Recitation instructor	Fall 2016
	Calculus 2 , Recitation instructor	Spring 2016
	Calculus 3 and Topics for Engineers , Tutor Tutored 4 hours per week at Math and Stat Learning Center, OSU	Fall 2014, Spring 2015, Fall 2015
	Introduction to Applied Algebraic Topology , Lecturer for 2 weeks A substitute for the original lecturer Tom Needham	Spring 2019