Bengier Ülgen Kılıç

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Education

- **Ph.D. in Applied Mathematics** (Expected, April 2023)
  University at Buffalo, State University of New York (SUNY), New York, USA
- **B.S. in Mathematics** (2017)
  Boğaziçi University, Istanbul, Turkey

Software Expertise

- **Expert:** Python, SQL, Cython, Matlab, SLURM, LaTeX, Illustrator, Microsoft Office, Jupyter notebooks, Numpy, scikit learn, PyTorch, Plotly, Pandas, ReadTheDocs, matplotlib, NetworkX
- **Intermediate:** AWS, PySpark, HTML, CSS, Git

Skills

- **Statistical analysis:** Linear regression, Clustering, Classification, Dynamic community detection, Dimensional reduction, Network analysis, Time-series analysis, Topological data analysis.
- **Machine learning:** Deep Learning, Image Recognition (CNNs), Natural Language Processing (RNNs).
- **High-performance computing:** Distributed computing.

Work Experience

Graduate Research Assistant – University at Buffalo, SUNY (2019–)

- Pursued high-impact journal publications, gave talks in major conferences and presented papers in journal club meetings.
- Ran multiple research projects, conducted quantitative scientific research, reviewed relevant literature, analyzed data.
- Built algorithms and models, developed codebases for quantitative research pipelines, prepared documentations.
- Collaborated with interdisciplinary scientists, gained analytical problem solving ability, communication skills and high autonomy.
- Obtained high-level knowledge in network-data analytics, topological & geometrical data analyses, computational neuroscience, data-oriented modeling, state detection, complex graphs, dynamical systems, spreading processes.

Graduate Teaching Assistant – Department of Mathematics, University at Buffalo, SUNY (2017–)

- Tutored and mentored undergraduate students, graded exams, held office hours.
- Taught undergraduate courses in mathematics key to STEM curriculum.
  - Math 141, College Calculus I — Fall'18
  - Math 142, College Calculus II — Spring'18/Spring'21/Fall'22
  - Math 231, College Calculus III — Fall'19/Fall'21/Spring'22
  - Math 309, Linear Algebra — Spring'20
  - Math 417, Survey of Multivariable Calculus — Spring'22

Adjunct Instructor – Department of Mathematics, University at Buffalo, SUNY (2019,2020)

- Administered undergraduate courses in mathematics.
  - Math 131, Mathematical Analysis for Management — Summer'19
  - Math 231, College Calculus III — Summer'20

Publications

- **Kilic, B. Ü.**, Taylor, D. Simplicial cascades are orchestrated by the multidimensional geometry of neuronal complexes. Communications Physics 5, 278 (2022), https://doi.org/10.1038/s42005-022-01062-3.
- **Kilic, B. Ü.**, Muldoon, S. Skeleton coupling: a novel method for choosing interlayer edges in temporal networks for dynamic community detection, 2022 (*In Preparation*).

Talks & Poster Presentations

- Boston University, Dynamical Systems Seminar (BU-DSS) 2022
  (Seminar Talk) Thresholding and multi-body interactions orient cascades in spatially embedded networks.
- Contagion on Complex Social Systems (CCSS) 2022
  (Contributed Talk) A simplicial threshold model for higher-order cascades.
- Network Science Society (Netsci2022) 2022
  (C. T.) Simplicial cascades are orchestrated by the multidimensional geometry of neuronal complexes.
- Northeastern Regional Conference on Complex Systems (NERCCS) 2022
  (C. T.) Simplicial cascades are orchestrated by the multidimensional geometry of neuronal complexes.
- Networks2021, A joint Sunbelt and NetSci conference 2021
  (C. T.) Higher-order flow channels of neuronal avalanches uncovered by topological data analysis of simplicial contagions.
- Northeastern Regional Conference on Complex Systems (NERCCS) 2021
  (C. T.) Characterization of communities in dynamic functional networks.
  (C. T.) Geometrical/topological data analyses reveal higher-order flow structures provide flow channels for neuronal avalanches.
- Northeastern Regional Conference on Complex Systems (NERCCS) 2019
  (C. T.) Biomedical image processing via persistent homology.
- Northeastern Regional Conference on Complex Systems (NERCCS) 2022
  (Poster) Skeleton coupling: novel method for choosing interlayer edges in temporal networks for dynamic community detection.
- Dynamics Days (DD) 2022
  (Poster) Cascades over simplicial complexes preferably follow geometrically reinforced channels.
- Society for Neuroscience (SFN) 2019
  (Poster) Cell detection and segmentation via persistent homology.

Leadership and Organization

Directed Reading Program - Turkey (DRP-Turkey) 2022

- Organized a remote directed reading program, with an in-person symposium, pairing undergraduate students with young researchers to work on selected topics in mathematics.
- Wrote grant proposals and reports, performed exploratory data analysis.

Professional Development

Neuromatch Academy Deep Learning summer workshop (NMA-DL) 2021

- Developed a deep learning framework (utilizing LSTMs, encoders/decoders etc.) for sentiment analysis from tweets, collaborated with interdisciplinary scientists via an agile based process (Github, Google Colab, Pytorch).

Topological insights in Neuroscience (MSRI) 2021

- Participated in an interdisciplinary workshop.

TopoNets, Networks beyond pairwise interactions, Satellite @ Networks 2021 2021

- Participated in a satellite workshop.

Biology, Analysis, Geometry, Energies, Links (bagel19), IMA 2019

- Participated in a two-week long workshop, presented posters.

Awards, Honors and Scholarships

- Obtained travel and lodging grant from University of Colorado at Boulder ($1000), CCSS. 2022
- Rewarded by honorable mention of the best poster award, NERCCS. 2022
- Obtained travel and lodging grant from The Institute for Mathematics and Its Applications ($750), IMA. 2019
- Contributed to the project 'Seizure control through state-specific manipulation of cell assemblies' (NSF SMA-1734795).

Volunteer activity

- Project mentor for '*Mathematics of deep learning* – (Directed Reading Program, Turkey) 2022
- Project mentor for '*Network analysis for real-world applications*' – (UB, Directed Reading Program) 2022
- Project mentor for '*Graph theoretical analysis of brain networks*' – (Directed Reading Program, Turkey) 2021

Languages

- Turkish (Native)
- English (Fluent)
- Greek (Elementary)

References

- **Sarah F. Muldoon** (Co-Advisor)
  Associate Professor, Department of Mathematics, CDSE Program, Neuroscience Program, University at Buffalo, SUNY
  (smuldoon@buffalo.edu)
- **Dane Taylor** (Co-Advisor)
  Assistant Professor, Department of Mathematics, CDSE Program, Univeristy at Buffalo, SUNY
  (danet@buffalo.edu)
- **Naoki Masuda** (Ph.D. Committee Member)
  Professor, Department of Mathematics, CDSE Program, University at Buffalo, SUNY
  (naokimas@buffalo.edu)