

İsmail Güzel

PhD Candidate

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Research Interests

- Topological Data Analysis, Dynamical Systems,
- Machine and Deep Learning Algorithms,
- Mathematical Finance, Time Series Analysis, Numerical Analysis

Education

- 2017– ongoing Ph.D. in Mathematics Engineering
Thesis: Topological Data Analysis and Machine Learning Algorithms
Advisor: Prof. Dr. Atabey Kaygun
- 2010 – 2014 M.Sc. in Mathematics (with thesis)
Dokuz Eylül University GPA: 3.88/4.00
Thesis: On highest eigenvalues of Regular Sturm-Liouville Problems
Advisor: Prof. Dr. Şennur Somali
- 2015 – 2016 B.Sc (Major) in Mathematics
Dokuz Eylül University GPA: 3.81/4.00
magna cum laude
- 2014 – 2015 Pedagogical Formation in Mathematics
Dokuz Eylül University
- 2012 – 2015 B.Sc (Minor) in Statistics
Dokuz Eylül University GPA: 3.29/4.00
- 2012 – 2013 Exchange Program in Denmark Aarhus University GPA: 3.66/4.00
Project: Solving equations via Eigenvalues and Eigenvectors
Advisor: Anders Nedergaard Jensen

Work Experience

- 2021 – present Visiting Researcher, Michigan State University via TÜBİTAK 2214-A
with Prof. Dr. Elizabeth Munch
- 2018 – present *Research and Teaching Assistant*, İstanbul Technical University
- 2019 – 2022 *Quantitative Analyst*, Algotecht
- 2020 – 2022 *Lecturer of Machine and Deep Learning Courses*, UcuncuBinYil
- 2015 – 2018 *Mathematics Teacher*, BAYSEM

Publications

— Journal Papers

- 2022 Classification of stochastic processes with topological data analysis, arXiv 2022.
Güzel İ., Kaygun A.
- 2022 *Detecting bifurcations in dynamical systems with CROCKER plots*, Chaos: An Interdisciplinary Journal of Nonlinear Science 2022.
Güzel İ., Munch E., Khasawneh F.
- 2022 *A new non-archimedean metric on persistent homology*, Computational Statistics, 2022.
Güzel İ., Kaygun A.
- 2019 *Operator splitting methods for computation of eigenvalues of regular Sturm-Liouville problems*, Surveys in Mathematics and its Applications
Güzel İ., Adıyaman M., Somali S.

— Conference Papers

- 2022 Classification of Stochastic Processes with Topological Data Analysis, BAŞARIM 2022 - 7th High-Performance Computing Conference, May 2022.
Güzel İ., Kaygun A.
- 2022 A Case Study on Identifying Bifurcation and Chaos with CROCKER Plots, Proceedings of TDA at SDM (SIAM Data Mining), April 2022.
Güzel İ., Munch E., Khasawneh F.

— Posters

- 2021 *Bifurcation Analysis with CROCKER plots*, CMSE Student Research Symposium at Michigan State University, Nov 2021.
Güzel, İ., Munch. E., Khasawneh F.
- 2021 *Hierarchical Clustering and Zeroth Persistent Homology*, Institute for Mathematical and Statistical Innovation (MSI), May 2021.
Güzel, İ., Kaygun, A.

Scientific Activities

— Seminar and Conference Talks

- 2022 Classification of Stochastic Processes with Topological Data Analysis, BAŞARIM2022, May 2022.
- 2022 A Case Study on Identifying Bifurcation and Chaos with CROCKER Plots, Proceedings of TDA: Applications of Topological Data Analysis to Data Science, Artificial Intelligence, and Machine Learning Workshop at SDM 2022.
- 2021 A Guided Tour of Data Science Ecosystem for Asset Managers Seminar at Quant Workshop: Developing an intraday trading strategy using order book data, machine learning and optimization, Chartered Financial Analyst (CFA) Istanbul Society in June 3-15, 2021
- 2016 *Computing Eigenvalues of Regular Sturm-Liouville Problems*, The 3rd Workshop of Association for Turkish Women in Maths. May, 27-29 Izmir, Turkey. (Joint with Ş. Somali)

— Attended and Selected Workshops, Courses

- 2022 Topological Data Visualization Workshop University of Iowa, May 16-20, 2022
- 2021 Computational Persistence ComPerWorkshop Purdue University, Nov 1-5, 2021
- 2021 Summer School: Theory and Practice of Deep Learning Gene Golub SIAM Summer School, July 19-30, 2021
- 2021 Quantum Information for Mathematics, Economics, and Statistics, Institute for Mathematical and Statistical Innovation (IMSI), May 24-28, 2021
- 2020 İMO2020 – Machine Learning in İstanbul (14 hours theoretical, 14 hours implementation), Mimar Sinan Fine Arts University, Feb 2020, Prof. Dr. Ş. İlker BİRBİL

Assisted Courses

- 2018 – 2021 Mathematics I
- 2018 – 2021 Mathematics II
- Spring 2019 Introduction to Programming Languages (C)

Projects

- 2020 – ongoing The Scientific Research Projects İTÜ (PhD Thesis Project)
- 2021 – ongoing The Scientific and Technological Research Council of Türkiye (TÜBİTAK), Grant 2214.

Computer Skills

- CAS Mathematica, SageMath
- Computation Python, R, Julia, Matlab
- Miscellaneous Linux, High-Performance Computing, Bash, Office programs, \LaTeX , Inkspace, Mathcha, IBM SPSS Statistics

Professional Service

— Review

- 2022 Topology, Algebra, Geometry in Machine Learning, ICML2022
- 2022 Geometrical and Topological Representation Learning, ICLR022
- 2021 Geometrical and Topological Representation Learning, ICLR2021

Scholarships

- 2017 – 2021 The Scientific and Technological Research Council of Türkiye, Grant 2211-A
- 2014 – 2016 Republic of Türkiye, State Scholarship (for masters education)
- 2011 – 2014 Zorlu Foundation Fellowship

Honors-Awards

- 2014 Graduate ranking first in Science Faculty, Dokuz Eylül University
- 2011 –2014 Certificate of high honor by Science Faculty Dean, Dokuz Eylül University

Languages

- Turkish (Native)
- English (Professional)

References

- Prof. Dr. Atabey Kaygun - kaygun@itu.edu.tr
- Asst. Prof. Dr. Elizabeth Munch - muncheli@msu.edu
- Dr. Ayhan Yüksel, CFA, FRM, PRM - ayhan.yuksel1@boun.edu.tr