İsmail Güzel

Senior Researcher, PhD Candidate

ORCID ID : 0000-0002-5888-7025

Network Technologies Department
Turkish Academic Network and Information Center
TÜBİTAK-ULAKBİM, Ankara, Türkiye
✉ *ismailgzel@gmail.com*
ismailguzel.github.io

Research Interests

- Topological Data Analysis, Dynamical Systems,
- High-Performance Computing, Big Data
- 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

2023 – present   Senior Researcher, Network Technologies Department
Turkish Academic Network and Information Center TÜBİTAK-ULAKBİM

2021 – 2022   Visiting Researcher(12 months), Michigan State University via TÜBİTAK 2214-A
with Prof. Dr. Elizabeth Munch

2018 – 2023   *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 - Mathematics

2022 *Detecting bifurcations in dynamical systems with CROCKER plots*, Chaos: An Interdisciplinary Journal of Nonlinear Science 2022. *This article was selected as Featured Article*
Güzel İ., Munch E., Khasawneh F.

2022 Persistent Homology, Matroids and Cobordisms, arXiv 2022.
Güzel İ., Kaygun A.

2022 Classification of stochastic processes with topological data analysis, arXiv 2022.
Güzel İ., Kaygun A.

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.

Journal Papers - Interdisciplinary

2023 *Phenolic Constituents, Antioxidant and Antimicrobial Activity and Clustering Analysis of Propolis Samples Based on PCA from Different Regions of Anatolia*, Molecules 2023.
Altuntaş Ü., Güzel İ., Özçelik B.

2022 *Attitudes and Behaviors of Turkish Consumers Regarding the Olive Oil Consumption*, Erzincan University Journal of Science and Technology 2022.
Altuntaş Ü, Güzel İ., Yılmaz Ö., Uluata S., Özçelik B.

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. Somalı)

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	Journal of Open Source Software, JOSS
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 |

References

- Prof. Dr. Atabey Kaygun - *kaygun@itu.edu.tr*
- Assoc. Prof. Dr. Elizabeth Munch - *muncheli@msu.edu*
- Dr. Ayhan Yüksel, CFA, FRM, PRM - *ayhan.yuksel1@boun.edu.tr*
- Prof. Dr. Burak Saltoğlu - *burak.saltoglu@boun.edu.tr*