

# Mert Erkul

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## Education

**ETH Zurich**, Zurich, Switzerland

Department of Computer Science - Data Science MSc.

Sep. 2020 – Jun. 2023

CGPA: 5.83/6.0 (Ausgezeichnet ~ Summa Cum Laude)

Thesis: *Constrained Two-Agent Zero-Sum Bandit Games with Gaussian Processes*

Advisor: Prof. Dr. Andreas Krause

**Bilkent University**, Ankara, Turkey

Department of Engineering - Electrical and Electronics Engineering BSc.

Sep. 2016 – Jun. 2020

CGPA: 3.92/4.0 (Summa Cum Laude)

**Nanyang Technological University**, Singapore, Singapore

School of Engineering - Electrical and Electronics Engineering BSc. Exchange

Aug. 2018 – Jan. 2019

CGPA: 5.0/5.0 (First Class Honors)

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## Experience

**EPFL - Sycamore Lab**, Lausanne, Switzerland

Doctoral Assistant

Sep. 2023 – Feb. 2024

Advisor: Prof. Dr. Maryam Kamgarpour

- Investigated game theory and (multi-agent) reinforcement learning theory inspired from reverse auctions and mechanism design.
- Focused on equilibrium properties of online agents employing learning algorithms in a decentralized manner.
- Proposed an algorithm for contextual multi-agent bandits with potentially strong convergence guarantees.

**ETH Zurich - Social Networks Lab**, Zurich, Switzerland

Research Assistant

Nov. 2021 – Jan. 2023

Advisor: Prof. Dr. Ulrik Brandes

- Worked with spatio-temporal tracking data obtained from UEFA to cluster passing patterns of players and teams by building spatial networks.
- Also worked with the same dataset to create modified formation detection algorithms through spatial graph structures.

**Karel Electronics**, Ankara, Turkey

Computer Vision Engineer Intern

Jun. 2019 – Jul. 2019

- Built a fullstack application that detects soldering defects in the printed circuit boards used for the phones manufactured in Karel's main factory.
- Utilized realtime 4K cameras, CV techniques such as SURF and SIFT, as well as Convolutional Neural Networks to identify the region of interests.

**Deloitte**, Istanbul, Turkey

Software Engineer Consultant Intern

Jun. 2018 – Jul. 2018

- Supported the digital team working with a client in the telecommunications industry to optimize circuitry in their high-power centrals.
- Main task was to build the frontend of their mobile application for progress monitoring, defect notification and power adjustment.
- Worked with Android Studio and Java, as well as SQL to connect users to the log database.

**Stigma Electronics**, Ankara, Turkey

Electronics Engineer Intern

Jan. 2017 – Feb. 2017

- Worked with elevator circuitry to optimize waiting time and idleness of the elevators in large buildings.
  - Mainly used Embedded C to support the electronics engineering team with helper subroutines.
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## Publications

**How to Read a Team's Spatial Expressions**

U. Brandes, H. Sotudeh, D. Parlak, P. Laffranchi, **Mert Erkul**

Under submission, ACM Knowledge Discovery and Data Mining (KDD) 2024

**Ask "Who", Not "What": Bitcoin Volatility Forecasting with Twitter Data**

M. E. Akbiyik\*, **Mert Erkul\***, K. Kaempfer\*, V. Vasiliauskaitė, N. Antulov-Fantulin

ACM International Web Search and Data Mining (WSDM) Conference 2023

**Tightening the Loop in Mixed-Initiative ML Engineering and Domain Annotation using Active Learning and Visual Analytics**

**Mert Erkul\***, P. Priyatamwong\*, B. Tomekce\*, M. Morales-Wyden, W. A. Baumgartner, E. White, M. Bada, L. Hunter, M. El-Assady

Visualization in Biomedical AI workshop @ IEEE VIS 2022

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## Teaching

### ETH Zurich - Deep Learning

Teaching Assistant

Lecturers: Prof. Dr. Thomas Hofmann, Prof. Dr. Fernando Perez-Cruz

Fall 2022  
263-3210-00L

### ETH Zurich - Network Analysis

Teaching Assistant

Lecturer: Prof. Dr. Ulrik Brandes

Fall 2022  
851-0252-15L

### ETH Zurich - Soccer Analytics

Teaching Assistant

Lecturer: Prof. Dr. Ulrik Brandes

Spring 2022, Spring 2023  
851-0557-00L

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## Significant Academic Projects

### Offline Reinforcement Learning for Efficient and Realizable Fertilization Policies, ETH Zurich

Research in Data Science - Grade: 6.0/6.0

Spring 2022

Supervisors: Scott Sussex, Dr. Matteo Turchetta, Prof. Dr. Andreas Krause

- Applied offline reinforcement learning algorithms such as CQL, IQL, AWAC, BC and BCQ to offline logs obtained from crop growth models.
- Main aim was to obtain sample efficient and generalizable policies that are better than the status-quo policies applied in real situations.
- Also tried to tackle state distribution shifts in different locations, as well as experimenting with offline-to-online fine tuning of these models to improve performance.

### Word-Level Adversarial Defense Layer for Robust Natural Language Classification, ETH Zurich

Deep Learning - Grade: 6.0/6.0

Fall 2022

Team: Mert Erkul, M. Herde, N. Canevascini, Y. Schneider

- Created a novel algorithm called WLADL to tackle word-level black-box adversarial attacks on document classification tasks.
- The main purpose was to generate a defense layer working similarly to a dropout layer, before tokenization to increase robustness.
- Worked with the IMDb, AG News and Yahoo! Answers datasets, showed competitive performance with SEM and vanilla adversarial training, against state-of-the-art attack algorithms such as BAE-R, GA and PWWS.

### BeeSMART, Bilkent University

Bachelors Graduation Project - Grade: 4.0/4.0

Spring 2020

Supervisor: Prof. Dr. Ezhan Karasan

- The project had embedded components consisting of GSM, GPS, Microphone, Weight, and Temperature sensors to monitor the smart hive in addition to Edge Learning.
- Implemented an audio classification pipeline using Convolutional Neural Networks with the C++ version of TFLite, to be compatible with an LPC1812 MCU.
- Main aim was to predict the internal conditions of the hive using bee sounds while simultaneously reporting the results to a cloud server to establish the IoT communication over MQTT with Android and Web applications for the clients.

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## Academic Achievements

- Comprehensive Scholarship (100% + stipend), Bilkent University, Turkey.
- Ranked 266th among 2.225.386 students in University Placement Examination.
- Comprehensive Scholarship (100%), TED Ankara College, Turkey.
- Ranked 106th among 1.075.533 students in High-School Placement Examination.

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## Skills

**Software:** Python, SQL, R, MATLAB, C/C++, JavaScript, Java, Swift, VHDL/Verilog

**Technologies:** PyTorch, TensorFlow, Keras, W&B, Spark, MongoDB, Neo4j, Hadoop, HDFS

**Tools:** Git, VSCode, Docker, PyCharm, React, d3.js, Wireshark, Arduino, AWS, XCode

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## Languages

English

Level: Advanced

German

Level: B1

French

Level: A2

Turkish

Level: Native

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## Examinations

TOEFL iBT

Date: 17 Aug. 2022

Grade: 114/120

GRE General Test

Date: 18 Jul. 2019

Grade: 325/340