# Çağrı Eser

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## Summary

I am a computer vision and machine learning researcher with over five years of experience in perception systems for autonomous vehicles. I completed my MSc in Computer Engineering at METU in 2024, where I also earned my BSc and a Minor in Mathematics. My thesis addressed class imbalance in long-tailed visual recognition, and my advisors were Sinan Kalkan and Emre Akbaş.

I am interested in a variety of topics across computer vision and deep learning. I like working on problems in long-tailed learning, multi-modal learning and applying geometric methods for robust machine learning. My current work explores the behavior of foundation models under various forms of imbalance.

## Education

**Middle East Technical University (METU)**, Ankara, Turkey
*MSc in Computer Engineering*, 2021–2024
GPA: 4.00/4.00
Thesis: *Mitigating Class Imbalance in Long-Tailed Visual Recognition Through the Use of Intrinsic Dimensionality*
Advisors: Prof. Dr. Sinan Kalkan; Assoc. Prof. Dr. Emre Akbaş

*BSc in Computer Engineering*, 2015–2020
GPA: 3.59/4.00

*Minor in Mathematics*, 2017–2020
GPA: 3.38/4.00

## Research Experience

**Researcher, METU-Balance Research Group**, 2021–Present
Investigating imbalance problems in deep learning.
- Focusing on manifold-based approaches and geometric methods, with an interest in the effect of imbalance factors on representation learning and multi-modal approaches.
- Developed a novel measure of imbalance based on the intrinsic dimensionality of data points, and demonstrated its effectiveness compared to cardinality-based approaches on multiple long-tailed datasets. Accompanying first-author manuscript published in *Neurocomputing*.
*Using:* Python, C++, PyTorch, NumPy, Matplotlib, W&B, Slurm

**Research Intern, Sabancı University (PURE)**, Summer 2019
Conducted research on multi-view kernel clustering under the supervision of Assoc. Prof. Dr. Öznur Taştan. Implemented and benchmarked multiple multi-kernel methods (e.g., MKKM-MR, L-MKKM) on biomedical datasets using Python and R. This work briefly contributed to a later publication at *Bioinformatics* by their group.

## Teaching Experience

**Adjunct Lecturer, CENG240 (Programming with Python), METU**, Spring 2024
Served as a lecturer for a university-wide course on programming with Python for engineers. Designed and delivered weekly lectures for 100+ students, created course materials and exam questions, and managed office hours.

## Industry Experience

**Computer Vision & Machine Learning Engineer, Kuartis**, October 2019–October 2025
Developed and maintained perception modules for autonomous vehicles, including 2D/3D object detection, panoptic segmentation, planning and sensor fusion. My workflow included data preparation, design, development, training and deployment of deep models with camera and LiDAR modalities. Led small teams of 2-3 members on internal projects, mentored trainees.
*Technologies:* Python, C++, PyTorch, ROS (1 & 2), CUDA, PCL, OpenCV, TensorRT

**Intern, SRDC (eHealth R&D)**, Summer 2018
Implemented doctor and patient interfaces for the company's project on multi-morbidity and patient care. Contributed to both back-end and front-end development.
*Technologies:* Java, Spring Boot, Angular

## Publications and Preprints

### Publications

**C. Eser**, Z.S. Baltaci, E. Akbas, S. Kalkan, *Intrinsic Dimensionality as a Model-Free Measure of Class Imbalance*, Neurocomputing (2026). DOI: https://doi.org/10.1016/j.neucom.2026.132938.
Preprint available on arXiv. Code available on GitHub.

### MSc Thesis

**C. Eser**, *Mitigating class imbalance in long-tailed visual recognition through the use of intrinsic dimensionality*, M.S. - Master of Science, Middle East Technical University (Turkey), 2024.
Available from OpenMETU.

## Technical Skills

**Programming: Python, C/C++**, CUDA, R, Java, SQL, LaTeX
**Frameworks: PyTorch**, **ROS (1 & 2)**, NumPy, OpenCV, PCL, TensorRT
**Tools:** Git, Linux, Docker, Slurm

## Languages

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|---|---|
| Turkish: | Native |
| English: | Excellent (IELTS Academic: 8.5/9) |
| French: | Elementary |
| German: | Elementary |

## Extracurricular Activities

**Head, METU Fine Arts Club (Music Branch)**, Fall 2019–Spring 2020
Managed the club's choir and orchestra, organized concerts and events, and facilitated music tutorships for students.

**Member, METU Interdisciplinary Studio**, Spring 2018
Designed a smart park project for the elderly with the sponsorship of Autodesk.

## Research Interests

Computer Vision, Long-Tailed Learning, Multi-Modal Learning, Representation Learning, Geometric Deep Learning, Robust Machine Learning, Topological Deep Learning

## Highlighted Coursework

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| **CENG783** | Deep Learning | **CENG483/463/499** | Intro. to CV/NLP/ML |
| **CENG796** | Deep Generative Models | **CENG561** | Artificial Intelligence |
| **MATH367** | Abstract Algebra | **MMI712** | ML Sys. Design & Deployment |