Ahmet Zahid Balcioglu

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EDUCATION

Honours of Bachelors of Science at University of Toronto, Nov 2018
Major in Physics, Minor in Mathematics, and Minor in Statistics.

Visiting Student at Boğazici University, Feb 2020-Feb 2021

Master of Science in Statistics at Yildiz Technical University, Sep 2019-Aug 2022

Thesis Advisor: Erhan Çene
Thesis Title: Order Statistics Based Training and Scoring Algorithms for Deep Outlier Detection

WASP Funded PhD Student Statistics at Chalmers University of Technology, Sep 2023-Current

Advisor: Fredrik Johansson
Research Intersets: non-linear ICA & related problems, contrastive learning, and causality

PUBLICATIONS

PhD Publications

1. ***Identifiable latent bandits: Combining observational data and exploration for personalized healthcare***, Presented at ICML 2024 Workshop, joint with Newton Mwai, Emil Carlsson, and Fredrik Johansson preprint available on https://arxiv.org/abs/2407.16239

Master's Publications

2. ***On a notion of outliers based on ratios of order statistics,*** joint with Oğuz Gürerk, preprint available on https://arxiv.org/abs/2207.13068
3. ***Adaptive Slot-filling for Turkish Natural Language Understanding***; IEEE Explore 7th International Conference on Computer Science and Engineering (UBMK), 2022.
4. ***Order Statistics Based Training and Scoring Algorithms for Deep Outlier Detection*** Presnted at 8th International Conference on Advnace Statistics (ICAS) 2022

RESEARCH PROJECTS

Chalmers University of Technology

Downstream Guarantees for Contrastive Learning — Jan 2025 – Present

- Studying linear downstream guarantees for contrastive learning from robust optimization perspective focusing on bounds for minmax type bounds for worst case downstream task.
- Applications to well-studied contrastive learning applications such as non-linear ICA.

- In collaboration with Ziyuan Wang and Anton Levinsson, in preparation for NeurIPS 2025.

User-oriented autonomous driving via latent decision making — March 2025 – Present

- In previous work we focused on using Identifiable latent decision making for personalized healthcare application. In this project, we take a more reinforcement learning based approcach and look for learning a personalizable driving experience

Identifiable Latent Bandits — Nov 2024 – Present

- Making use of observational data for online-decision making by training an identifiable latent varaible model. Latent variable model allows for sample efficiency in decision time and makes exploaration possible for ml based approaches.
- Applications to personalized healthcare study on semi-synthetic Alzheimers data.
- In collaboration with Newton Mwai, Emil Carlsson, and Fredrik Johansson presented at ICML 2024 WS and submitted to ICML 2025.

Boğazici University Department of Mathematics, in collaboration with Oğuz Gürerk:

Outliers, order statistics, and concentration inequalities — March 2021 – Present

- Main goal of our project is to have a distribution invariant robust estimator for anomalies based on order statistics.
- Our methodology can be paired with already existing machine learning methods.
- Theoretical and simulation study of the distribution and the asymptotic behaviour of the chosen statistic.
- A new python library for heavy-tailed data, anomalous data generation and order statistic simulations. https://github.com/Selozhd/orderstats

MSc. thesis with Erhan Cene:

Order statistics guided deep outlier detection — March 2021 – Present

- Main goal of the thesis is to incorporate my previously done research in *'Outliers, order statistics, and concentration inequalities'* project to a deep learning stepping in order to create a robust algorithms that can be successful in high-dimensional setting.
- Contributions:
  - Order statistics based early stopping algorithm.
  - Order statistic augmented loss function.
  - An algorithmic outlier scoring and selection method.
  - A research focused python library which implements the proposed algorithms, implements other robust algorithms for autoencoder outlier detection, introduces an autoencoder specific training loop for easier tracking of metrics during training. (https://github.com/Selozhd/meta-outliers)

Artificial Intelligence R&D team in ETIYA:

Distilling transformer models for a low data setting — March 2020 – December 2021

- Main goal of the project is to establish a fast training model for an interactive dialogue system.

- Transformer + CRF (conditional random field) model working in a low-data setting.
- Successful transfer learning of transformer models using convex optimization.
- A new methodology for stemming using word-piece tokenizers for agglutinative languages.
- Applying new stemming in the context of dialogue systems.
- Presented at IEEE Explore 7th International Conference on Computer Science and Engineering 2022

WORK EXPERIENCE

AI Engineer, Artificial Intelligence Team, ART Labs; January 2022 – August 2023

- Leading a 3D reconstruction squad which aims to generate high-quality 3d representation of shoes from a few images.
- Creating a neural radiance fields based pipeline of 3d content generation
- Involved in the development of a framework independent 3d research library which is used for fast prototyping of new research in neural rendering.

Specialist, Artificial Intelligence Research & Development, ETIYA Information Technologies; March 2020 – December 2021

- Involved in the research and development of deep learning and machine learning algorithms for natural language processing and anomaly detection.
- Proposed, led, and prepared biweekly reports for two research projects.
- Worked with the product team to build a slot-filling model for natural language understanding.
- Worked in collaboration with the backend team for the development and maintenance of a deep anomaly detection service.
- Certificates from data science, and TM Forum trainings: Blue Mark Academy Practical Machine Learning; TM Forum: Open API Fundamentals, AI in Telecoms Overview, Information Framework (SID) Fundamentals.

Analyst, R&D Team; Standart Insulation Materials Inc.; Nov 2018 – Sep 2019

- Communicated with solar power companies, and developed an LSTM based model in order to do a cost-benefit analysis for a company investment solar power.

TEACHING EXPERIENCE

Teaching Assistant; Chalmers University of Technology:

- TIN 092 – Algorithms, Winter 2024
- DIT 407 – Intorduction to Data Science and AI, Winter 2024
- TIN 092 – Algorithms, Fall 2024
- TIN 092 – Algorithms, Winter 2025

Student Assistant; Yildiz Technical University, Department of Statistics:

- IST 3121 - Regression Analysis I, Fall 2019
- IST 5110 - Advanced Regression Analysis, Winter 2020

SELECTED TALKS

- Noise Contrastive Estimation and Applications to Representation Learning, DSAI Seminars at CSE, Chalmers— November 2024
- Identifiable Latent Bandits, Vector Institute University of Toronto— October 2024
- Studying the downstream of ICA, Healthy AI group, Chalmers — September 2024
- Identifiable latent bandits: Combining observational data and exploration for personalized healthcare, Poster at ICML WS for RL and Control— July 2024
- Variational Frameworks for ICA, Healthy AI group, Chalmers— February 2024
- Time Contrastive Learning for ICA, Healthy AI group, Chalmers— October 2023
- Adaptive Slot-filling for Turkish Natural Language Understanding, 7th International Conference on Computer Science and Engineering (UBMK) — September 2022
- Order Statistics Based Training and Scoring Algorithms for Deep Outlier Detection, 8th ICAS Conference 2022 — May 2022
- Outliers and Anomalies, Probability and Statistics Seminars, Boğaziçi University, Istanbul — Jan 2021
- Concentration of Measure and Almost Spherical Sections, Student Seminars in Analysis, Boğaziçi University, Istanbul — Jan 2021
- Martingales and Black-Scholes Equation, Probability and Statistics Seminars, Boğaziçi University, Istanbul — June 2020
- Dimension Reduction Techniques for Discrete Data, Graduate Student Seminars, Yildiz Technical University, Istanbul — Nov 2020
- Deep Learning Solutions of Differential Equations, Graduate Student Seminars, Yildiz Technical University, Istanbul — Dec 2020

ADVANCED COURSEWORK

Boğazici University, Department of Mathematics:

- MATH 541 - Graduate Probability Theory *(Durrett, R.. Probability: theory and examples)*
- MATH 531 - Real Analysis I *(Folland, G. B. Real analysis: modern techniques and their applications)*
- MATH 532 - Real Analysis II *(Folland, G. B. Real analysis: modern techniques and their applications)* ❖ MATH 533 - Complex Analysis *(Stein, E. M., & Shakarchi, R. Complex analysis)*

COMPUTATIONAL & PROGRAMMING SKILLS

- **Python**

Over 9 years of experience, familiar with libraries used in machine learning, scientific studies, well as some used in web development. Used python at work and at school for physics and statistics courses and projects, which were mainly about deep learning, solving differential equations, machine learning, data analysis, and visualisation &c.

- **R**

Over 7 years of experience, familiar with many different libraries used in scientific studies and statistical analysis. Used throughout statistics courses and projects for various purposes including machine learning, data analysis, and data visualisation &c.

EXTRACURRICULAR & SKILLS

- **PhD Student Council WASP, Sweden; April 2025-**
- **PhD Student Council at the Department of Computer Science, Chalmers; Nov 2023-Nov 2024**
- **Yildiz Technical University Data Science Society Datathon, May 2020** This was a datathon (data science marathon) which I organised in collaboration with the University Data Science student club. Conducted online due to the COVID-19 pandemic.
- **Member, Yildiz Technical University Data Science Society, March 2020– Present**
- **IDAO International Data Science Competition, Feb 2021 – Feb 2021**

Joined in a team of three. We were tasked with an image recognition problem involving images H and He atoms. Served as an opportunity to familiarise myself with the basic image processing techniques and models.

- **IDAO International Data Science Competition, Jan 2020 – Feb 2020**

Joined in a team of three. We were tasked with a real life problem in astronomical models. We applied machine learning algorithms to find the best applicable solution.

- **Member & Vice President, University of Toronto Go Club; — Sep 2015 – Sep 2018**

Member of the Go Club since 2015 and Vice President after Sep 2017. Arranged weekly meetings, prepared annual events such as tournaments, movie screenings, picnics, and other social events.

- **Member, UTFOLD — July 2014 – August 2014**

Making origami flowers in order to raise awareness for cancer. Entered the Guinness book of records through making the most origami flowers.

- **Member, Physics and Astronomy Students Association — Sep 2013 – Apr 2018**
- **University Physics Competition, Bronze Medal — 2013**
- **University of Toronto, Faculty of Arts and Sciences, Dean's List — 2013**