

Ahmet Zahid Balcioglu

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<https://selozhd.github.io>

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 Supervisor: Erhan Çene

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

PUBLICATIONS

1. *On a notion of outliers based on ratios of order statistics*, joint with Oğuz Gürerk, preprint available on arxiv.org
2. *Adaptive Slot-filling for Turkish Natural Language Understanding*; IEEE Explore 7th International Conference on Computer Science and Engineering (UBMK), 2022.
3. *Order Statistics Based Training and Scoring Algorithms for Deep Outlier Detection*; submitted to 'Engineering Applications of Artificial Intelligence'. Preprint available upon request.

RESEARCH PROJECTS

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>

Optimal Control in Epidemiological Systems June 2021 Nov 2021

- ❖ Developing a variant of the SIR models that accounts for vaccination, waning immunity in order to do formulate an optimal control problem for best vaccination policies.

- ❖ Responsible for simulations of the SIR model and for computationally solution of the optimal control problem.

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 with low-data.
- ❖ Successful transfer learning of transformer models with Newton’s method optimization.
- ❖ A new methodology for stemming using word-piece tokenizers for agglutinative languages.
- ❖ Applying new stemming in the context of dialogue systems.

Research for an embedding guided RNN March 2020 December 2021

- ❖ Main goal of the project is to effectively incorporate predetermined memory state based into a recurrent neural network, which can selectively memorise past states in the sequence.
- ❖ We expected that with the selection of a good memory state we may in affect reduce the need for training time and data.

WORK EXPERIENCE

AI Engineer, Artificial Intelligence Team, ART Labs; January 2022 Present

- 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

Student Assistant; Yildiz Technical University, Department of Statistics:

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

SELECTED TALKS

- ❖ 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
- ❖ Concentration of Measure and Almost Spherical Sections, Student Seminars in Analysis, Boğaziçi University, Istanbul — Jan 2021
- ❖ Outliers and Anomalies, Probability and Statistics Seminars, Boğaziçi University, Istanbul — Jan 2021
- ❖ Order Statistics Based Training and Scoring Algorithms for Deep Outlier Detection, 8th ICAS Conference 2022 — May 2022
- ❖ Adaptive Slot-filling for Turkish Natural Language Understanding, 7th International Conference on Computer Science and Engineering (UBMK) — September 2022

RELEVANT COURSEWORK

Boğaziçi 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*)

Yildiz Technical University, Department of Statistics:

- ❖ IST 5115 - Non-Linear Programming (*Luenberger & Ye, Linear and Nonlinear Programming*)

- ❖ IST 6115 - Applied Generalised Linear Models I (*Dobson & Barnett, An Introduction to Generalized Linear Models*)
 - ❖ IST 6106 - Advanced Multivariate Statistical Methods
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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.

❖ Haskell

A few months of months of experience. Used in a work project initially, and subsequently for learning a declarative programming style.

EXTRACURRICULAR & SKILLS

❖ 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