Batuhan Koyuncu

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Education

- **Saarland University**   Saarbrücken, Germany
  Ph.D. Computer Science, Advisor: Prof. Isabel Valera   *2021 - Present*
  - **Research Interests:** Deep generative modeling, probabilistic modeling for time-series data.
  - ELLIS Ph.D. student, co-advised by Prof. Ole Winther.

- **Bogazici University**   Istanbul, Turkey
  M.Sc. Computer Engineering, Advisor: Prof. Lale Akarun   *2018 - 2021*
  - GPA: 3.8/4

- **Bogazici University**   Istanbul, Turkey
  B.Sc. Physics   *2013 - 2018*
  - **Accomplishments**:
    * Ranked as 3rd in the class of 2018 with GPA:3.47/4
    * Recipient of Fulbright Ph.D. Grant (2018)
    * Turkish Research Council Undergraduate Scholarship ($20k) (2014-2018)
    * Awarded with Bogazici University Honor Certificate

Research Experience

- **Saarland University**   Saarbrücken, Germany
  Research for Ph.D. Thesis   *Present*
  - Interpretable and robust generative models for multivariate time-series data.
    Development of deep learning architectures for time-series forecasting, i.e. efficient and scalable probabilistic transformer architectures.
  - Efficient and expressive architectures for learning implicit neural representations.
    Amortized inference based learning for INRs which enables conditional usage and provides (up to) 10 fold speed improvement during inference.
  - Real-life applications for personalized stress nowcasting.
    Development of hierarchical ML pipelines for detecting and forecasting stress levels using wearable data.
  - Expressive auto-regressive generative models with INRs.
  - Scalable methods for personalized time-series imputation and forecasting for healthcare domain.

- **Bogazici University**   Istanbul, Turkey
  Research for M.Sc. Thesis   *Fall 2020 - Summer 2021*
  - Worked with Prof. Lale Akarun and Prof. Ali Taylan Cemgil (currently at DeepMind) on analysis and regularization of deep generative second order ordinary differential equations.
    Building physics-guided inductive bias into temporal generative models to increase interpretability and performance.

- **Bogazici University**   Istanbul, Turkey
  Medical and Biological Physics Research Group   *Fall 2019 - Fall 2020*
  - Worked with Prof. Mehmet Burcin Unlu as a graduate research assistant with the focus on building deep learning models for medical physics problems.

- **University of California, Irvine**   Irvine, CA
  Undergraduate Research Assistant   *Summer 2017*
  - Worked on designing electronic circuits for photo-magnetic imaging system and developing a data acquisition pipeline for CT guided molecular fluorescence tomography system using MATLAB.

Manuscripts

- **Publications**
  - **Koyuncu, B.**, Bauerschmidt, T.N., Valera, I.(2024). E-ProTran: Efficient Probabilistic Transformers for Forecasting. Workshop on Structured Probabilistic Inference & Generative Modeling, ICML.
  - **Koyuncu, B.**, Kıran, A. D., ..., Valera, I. (2024). From Laboratory to Everyday Life: Personalized Stress Prediction via Smartwatches. Machine Learning for Life and Material Science Workshop, ICML.
  - **Koyuncu, B.**, Sanchez-Martin, P., Peis, I., Olmos, P. M., Valera, I. (2023). Variational Mixture of HyperGenerators for Learning Distributions Over Functions. International Conference on Machine Learning (ICML).
  - Parlatan, U., Ozen, M. O., Kecoglu, I., **Koyuncu, B.**, ..., Demirci, U. (2023). Label-Free Identification of Exosomes using Raman Spectroscopy and Machine Learning. Small, 2205519.
  - **Koyuncu, B.**, Melek, A., Yilmaz, D., Tuzer, M., Unlu, M. B. (2022). Chemotherapy response prediction with diffuser elapser network. Scientific Reports, 12(1), 1-13.
  - **Koyuncu, B.** (2021). Analysis of ODE2VAE with Examples. Fourth Workshop on Machine Learning and the Physical Sciences, NeurIPS. arXiv:2108.04899

Talks & Presentations

VaMoH: Inferring distributions over functions
at ELLIS Alicante Unit
Alicante, Spain
April 2023

Using CNNs to learn dynamics of coupled PDEs
at Bogazici University
Istanbul, Turkey
March 2020

Utilizing deep learning models to predict chemotheraphy response
at Kodluyoruz Research
Istanbul, Turkey
February 2020

Solving Combinatorial Optimization Problems with RL
at Inzva
Istanbul, Turkey
November 2019

Teaching

ProbAI Summer School
Assistant Instructor
Copenhagen
Summer 2024
- TA for Variational Inference and Optimization, and Introduction to Deep Generative Models sessions.

Machine Learning Course
Assistant Instructor
Saarland University
Spring 2023
- Preparation of course material for regression and classification modules.
- Preparing and maintaining semester project on sentiment prediction in Twitter.

Data Science and AI Project
Assistant Supervisor
Saarland University
Spring 2023
- Supervising undergraduate and master students for term-project "Conformal Predictions for Traffic Sign Recognition".

AI Labs Joint Program
Assistant Instructor at Inzva Hacker Community
Fall 2020
- Preparation of notebooks for multi-object tracking workshop and guiding discussion sections.

Skills

- **Programming languages:** Python, MATLAB, C++, Cython, SQL

- **Frameworks:** Pytorch, Keras, Tensorflow, ROOT, Git