Arda Fazla

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Education

Master of Science - **Electrical and Electronics Engineering (3.91/4.00)**   2021-2024
Bilkent University - Faculty of Engineering   Ankara, Turkey
Thesis: Novel Ensembling Approaches in Time Series Forecasting
Advisor: Prof. Süleyman Serdar Kozat

Bachelor of Science - **Electrical and Electronics Engineering (3.61/4.00)**   2017-2021
Middle East Technical University - Faculty of Engineering   Ankara, Turkey

Research Interests

• Machine Learning (Tree-Based Models, Ensemble Models)
• Deep Learning (Neural Networks, Sequence Models, Transformers, Generative Networks)
• Optimization (Constrained/Unconstrained Optimization, Multi-Objective Optimization, Gradient Descent Variants)
• Online Learning (Fine-tuning, Transfer Learning, Online Convex Optimization)
• Time Series Analysis and Forecasting (Univariate & Multivariate Forecasting, State Space Models, Anomaly Detection)

Publications 🎓

Journal Papers

4. **A. Fazla**, M. E. Aydin, S. S. Kozat, *"Time-Aware and Context-Sensitive Ensemble Learning for Sequential Data"*, IEEE Transactions on Artificial Intelligence, 2023, **Accepted**.
   Available: https://doi.org/10.1109/TAI.2023.3319308
   Code: https://github.com/ardafazla/context-time-aware-ensemble

3. S. F. Tekin, **A. Fazla**, S. S. Kozat, *"Numerical Weather Forecasting using Convolutional-LSTM with Attention and Context Matcher Mechanisms"*, IEEE Transactions on Geoscience and Remote Sensing, 2023, **In Second-Stage Revision**.
   Available: https://arxiv.org/abs/2102.00696
   Code: https://github.com/sftekin/spatio-temporal-weather-forecasting

2. M. E. Aydin, **A. Fazla**, S. S. Kozat, *"Hybrid State Space-based Learning for Sequential Data Prediction with Joint Optimization"*, IEEE Transactions on Neural Networks and Learning Systems, 2023, **In Revision**.
   Available: https://arxiv.org/abs/2309.10553
   Code: https://github.com/mustafaaydn/lstm-sx

1. **A. Fazla**, M. E. Aydin, S. S. Kozat, *"Joint Optimization of Linear and Nonlinear Models for Sequential Regression"*, Digital Signal Processing, Elsevier, 2022, **Accepted**.
   Available: https://doi.org/10.1016/j.dsp.2022.103802
   Code: https://github.com/ardafazla/jointoptimization

Conference Papers

1. K. G. Ince, A. Köksal, **A. Fazla**, A. A. Alatan, *"Semi-Automatic Annotation for Object Detection"*, Proceedings of the IEEE/CVF International Conference on Computer Vision, 1233-1239, 2021, **Accepted**.
   Available: https://doi.org/10.1109/ICCVW54120.2021.00143

In Progress

2. **A. Fazla**, S. S. Kozat, *"Online Causal Inference for Modeling User Preferences: A State-Space Approach"*, to be submitted to IEEE Transactions on Neural Networks and Learning Systems, 2023.

1. **A. Fazla**, S. S. Kozat, *"Context-Aware ARIMA-Tree with Switching Regions for Nonstationary Environments"*, to be submitted to IEEE Transactions on Signal Processing, 2023.

Academic Awards

Turk Telekom & Information and Communication Technologies Authority   2023-2024
- Awarded 5G and Beyond Joint Graduate Support Programme, a merit-based fellowship of monthly stipend during M.Sc.

Scientific and Technological Research Council of Turkey   2021-2023
- Awarded Directorate of Science Fellowships and Grant Programme, a merit-based monthly stipend and accommodation support during M.Sc.

- Received the **373rd** rank among 2M high school graduates in University Entrance Examination.

- Received the **11th** rank among 0.2M high school graduates in ALES (National GRE).

Academic Duties

Tutoring and Grading   2021 - Present
- *Electrical and Electronics Engineering, Bilkent University*
- EEE321 Signals and Systems
- EEE202 Circuit Theory
- MATH255 Probability and Statistics

Relevant Coursework

- Neural Networks (4.0/4.0)
- Statistical Learning and Data Analytics (4.0/4.0)
- Random Processes (4.0/4.0)
- Deep Generative Networks (4.0/4.0)
- Introduction to Computer Intelligence (4.0/4.0)
- Data Structures (4.0/4.0)
- Digital Signal Processing (4.0/4.0)

Research Projects

Hourly Wind Energy Prediction   2023
- *Bilkent University*
- Predicted the hourly energy data of multiple wind turbines in Turkey and Europe, which show chaotic and nonstationary behaviour in multiple regions.
- Developed a large-scale ML framework, consisting of various deep-learning (NN, ConvLSTM), machine learning (LightGBM, RandomForest), statistical (SARIMAX) models and state-of-the-art ensembling techniques.

Natural Gas Demand Prediction   2022
- *Bilkent University*
- Predicted the daily data of international natural gas demand in Turkey, which contains nonstationary multivariate time series from multiple sources.
- Developed a large-scale ML framework, consisting of various machine learning (LightGBM, MLP, LSTM) and statistical (exponential smoothing, SARIMAX) models and state-of-the-art ensembling techniques.

Small-Target Detection & Tracking   2021
- *Middle East Technical University*
- Developed an application using Python for real-time small target tracking by leveraging temporal data derived from the output of object detectors.

Additional Projects

Multi-modal Photo Upsampling via Latent Space Exploration of StyleGAN 2023
- *Bilkent University*, Deep Generative Netwoks Course Project
- Adapted the PULSE algorithm for multi-modal image super-resolution by incorporating a variational autoencoder to enhance network diversity.

Image Captioning based on LSTM with Transfer Learning 2022
- *Bilkent University*, Neural Network Course Project
- Constructed a framework, which generates meaningful sentences describing a given image (Image Captioning).
- Employed state-of-the-art models such as ResNet, VGG-16 and InceptionV3, where LSTM is used as the main learning model for transfer learning.
- Used BERT transformers for word embedding.

Surveillance – Protective Measures 2021
- *Middle East Technical University*, Senior Year Project
- Designed a product that detects whether a person is not wearing a mask and/or showing fever symptoms.
- Our mask detection system uses the YOLOv4 algorithm for classification, trained on a self-constructed dataset with image augmentation.
Available: http://capstone.eee.metu.edu.tr/project-fair-2021/#BOMAS

Semi-Automatic Video Annotation for Object Detection 2021
- *Middle East Technical University*, EEE STAR Program, Finalist
- The project mainly involves computer vision and image processing. It consists of two parts: first, a multi-hypothesis tracking algorithm is introduced and then an annotation tool employing this algorithm is given.

Software Skills

- **Pyhton:** Professional research and industrial experience based on machine learning. High knowledge and experience on libraries such as *PyTorch*, *Tensorflow*, *Pandas*, *Numpy* and *Scikit-Learn.* I have experience with Docker and Git, via industrial projects.
- **MATLAB:** Professional research experience in signal processing and computer vision. Used for projects during my undergraduate courses, undergraduate research, and internships.
- **R:** Intermediate level experience, employed during research based on time-series forecasting using statistical models.
- **C/C++:** Intermediate experience in Arduino and various undergraduate projects.

Languages

Turkish: Native
English: Conversationally Fluent [TOEFL IBT 108/120 (Available Through: October 19, 2024)]