ABTIN MOGHARABIN

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Education

Middle East Technical University[1] (Ankara, Turkey) October 2020 – Present[2]

- Major in Statistics (CGPA: 3.91/4.00)
- Minor in Mathematics (CGPA: 4.00/4.00)
- Elective Final Year Project (Advisor: Vilda Purutçuoğlu): This project analyzed the relationship between linguistic influences and happiness using Turkey's national Family Structure Survey, provided by the Turkish Statistical Institute (TÜİK). The analysis was conducted through the application of Bayesian Networks.

Research Experience

University of Cambridge (Cambridge, England[3])

Undergraduate Researcher (Advisors: Sinan Kalkan, Jiaee Cheong) Aug 2024 – Present

- Joint work between Cambridge Affective Intelligence and Robotics Lab (AFAR) and METU ImageLab.
- Worked on deep learning-based multimodal depression detection utilizing audio and EEG neurological data.
- Implemented and analyzed the impact of various architectures on fairness, with a focus on both supervised and unsupervised learning methods.
- Gained hands-on experience in large-scale GPU training workflows, including using Slurm and SSH.

Middle East Technical University (Ankara, Turkey)

Undergraduate Researcher (Advisor: Barbaros Yet) Feb 2024 – Jan 2025

- Worked on a variation of agent-based models of Bayesian decision theory in a medical shared decision-making setup.
- Modeled the conversation strategies employed by patients and the doctors as a language game, consisting of various states, utilities, costs, and rewards.

Undergraduate Researcher (Advisor: İlkay Ulusoy) Jul 2023 – Jan 2024

- Oversaw the preprocessing and segmentation of rs-fMRI and MRI neuroimaging datasets.
- Utilized Gaussian mixture models to cluster the Inter-Subject Correlation features in fMRI and extract the segmentation map for the brain's activity region.
- Worked on Dynamic Bayesian Networks developed from fMRI images to compare Alzheimer's vs Normal Brain region connectivity.

Relevant projects

First-Order PPL [GitHub] Aug 2024 - Current

- Implementation of a first-order Bayesian probabilistic programming language in Julia, supporting basic inference algorithms such as Importance Sampling, Metropolis Hastings, Gibbs Sampling, and Variational Inference.

Make Me a BNN [GitHub] Feb 2024 - Jun 2024

- Implemented and reproduced the results of Bayesian Normalization Layers (BNL), CVPR 2024, contributing to the field as no implementation was available for this paper.
- Conducted extensive experiments on image classification and semantic segmentation tasks (e.g., ImageNet, StreetHazards, BDD-Anomaly) using diverse architectures (e.g, WideResNet28-10, ViT, DeepLabV3+) with BNL adaptations.

[1]English is the Main Language of Instruction [2]Expected Graduation: July 2025 [3] Remote

Carotid Artery Ultrasound Segmentation [GitHub] Nov 2022 - Jan 2023

- Surpassed previous benchmark results for Cardiovascular segmentation by leveraging Mendeley dataset, achieving a Jaccard index of 91.86%.
- Optimized model performance through various strategies for architectures including U-Net, ViTs, and IterNet.

Teaching

- Acted as the student assistant for the Mathematical Statistics I and II courses (Course Instructor: Zeynep Işıl Kalaylıoğlu) during the 2022-2023 academic year. Offered office hours for over 100 students and provided weekly individualized support and problem-solving.

Preprints

- **Abtin Mogharabin**, Vilda Purutçuoğlu. (2025), A Network Analysis of Family Dynamics, Linguistic Influences, and Happiness in Turkey *Under Submission at the Journal of Science: Engineering and Innovation, Gazi University*
- Barbaros Yet, **Abtin Mogharabin**, Alaz Aydın (2025), Rational Speech Act models to deal with Priming Strategy for Clinical Decision Support *Under Submission at the 23rd International Conference on Artificial Intelligence in Medicine, 2025*
- **Abtin Mogharabin**. (2024), Modeling Emotional Functions in Medical Shared Decision-Making: A Bayesian Approach [PDF]

Software Projects

- Developed a R Web App on Asylum Seekers Data, supporting various machine learning and statistical visualization methods. [GitHub]
- Implemented a Combinatory Categorial Grammar-based linguistics semantic parser in Python. [GitHub]
- Implemented a Scheme interpreter in Julia. [GitHub]

Skills and Interests

- **Programming Skills** Proficient in Python, R, and Julia. Prior experience with C++, JavaScript, MATLAB, and Haskell
- **Machine Learning Tools**: Experienced with PyTorch, TensorFlow, PyTorch Geometric, Keras, WandB, Scikit-learn, and NumPy.
- **Probabilistic Modeling Tools**: Experienced with PyMC (Python), Gen (Julia), and WebPPL (JavaScript).
- **Miscellaneous** Experienced in Git, UNIX, LaTeX, and Microsoft Excel
- **Languages** Persian (Native), English (Full Professional Proficiency)
- **Research Interests** Responsible AI, Cognitive AI, Deep learning, Bayesian Modeling,
- **Graduate Coursework** Deep Learning, Advanced Deep Learning, Introduction to Probabilistic Programming, Probabilistic Models of Cognition, Probability Theory, Computational Semantics, Theoretical Linguistics
- **Selected Undergraduate Coursework** Multivariate Analysis, Mathematical Statistics, Algorithms and Data Structures, Introduction to Optimization, Statistical Data Analysis, Real Analysis (3 courses), Stochastic Processes, Introduction to Mathematical Analysis, Introduction to Differential Equations, Linear Algebra, Statistical Design of Experiments, Artificial Intelligence: Applications in Education, Statistical Computing

Awards and Achievements

- The First rank, Achieving the highest cumulative GPA in a batch of 113 (Present).
- Received METU's 100% international students' tuition fee payment scholarship (2021-2024).