Onur Barut

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Summary

Highly accomplished AI Scientist with a proven track record of training, designing, and optimizing AI models for various projects. Experienced in leading innovative research efforts in product retrieval, video understanding with multimodal models, visual quality enhancement with super-resolution, network traffic identification, and malware detection using machine learning. Demonstrated leadership in mentoring teams and interdisciplinary collaboration in multiple workgroups, while also excelling in independent work environments.

Experience

Lead Machine Learning Engineer, Wizard Commerce – (Remote) MA Oct. 2024-***Present***

- Designed LLM-powered product information-based attribute identification workflow for AI enrichment.
- Improved LLM-based product attributed extraction and recommendation improvement.

AI Software Architect, Intel Corporation – (Remote) MA June 2022-Oct. 2024

- Generated synthetic data with VLM to fine-tune a smaller language model for document question-answering.
- Trained and open-sourced a multi-modal visual RAG model with LLaMA and increased retail security by 30%.
- Designed and open-sourced deep learning models for Network-AI projects and optimized their performance on Intel hardware according to customers computation budget, up to 50% boosted throughput.
- Developed to open source a video super-resolution model achieving increased quality by 2% in PSNR and reduced artifacts with minimum additional computation cost.
- Led research on network security and video quality enhancement, including super resolution and published/presented more than 5 papers internally and externally.

Research Assistant, ACANETS Lab, University of Massachusetts – MA Aug. 2018-May 2022

- Increased malicious traffic detection rate to above 90% and model expansion capabilities by proposing a transformer based deep learning model.
- Organized NETAML Competition 2020, collected and open-sourced HAR-UML20 dataset.
- Developed a multi-task LSTM model for activity classification and intensity estimation with >95% accuracy.

Graduate Intern for Machine Learning, Intel Corporation – CA May 2019-Aug. 2019

- Developed end-to-end machine learning pipelines for network traffic analysis and improved the throughput 15% by optimizing the flow feature selection algorithm.

Teaching Assistant, University of Massachusetts – MA Fall 2018

- Coordinated lab work and conducted tutoring sessions for Logic Design course.

System Design Engineer, Aselsan – Turkey Feb. 2014-July 2018

- Led the team for flight test data acquisition tasks and system integration tests.
- Increased the flight test data acquisition speed by 5x replacing PCM with an Ethernet interface.
- Contributed to Electronic Warfare Self-Protection (EWSP) integration projects with flight data acquisition.

Telecommunication Engineer Intern, Turkcell – Turkey July 2013-Sept. 2013

- Worked on improving mobile coverage and cell planning in crowded places.

System Design Engineer Intern, Aselsan – Turkey June 2013-July 2013

- Designed a three-loop autopilot system for missiles using MATLAB.

Electronics Engineer Intern, *C3S LLC* – Turkey June 2012-July 2012

- Programming Automatic Test Unit for continuing tests using IC wiring diagrams.

Skills

- **Deep Learning:** Algorithm Development, Transformers, Inference Optimization, Large Multimodal Models
- **Programming:** Python, PyTorch, TensorFlow, ONNX, OpenVINO, MATLAB, C/C++, git, OpenCV, GIS
- **System Design:** Docker containers, Virtual Machines, RESTful API design, AWS, GCP, ElasticSearch, MongoDB
- **Aircraft Testing:** Automated electrical continuity testing, test flight data collection, sensor calibration

- **Leadership/Achievements:** Dean's Gold Medal Award (2022), Treasurer of New England Turkish Student Association (2021-2022), Secretary of Turkish Cultural Club (2018-2022), Ranked top 0.03% in university entrance exam in Turkey (2009)

Education

- Ph.D. in Computer Engineering, University of Massachusetts Lowell 2022
  Dissertation title: *Network Traffic Analysis and Malware Detection Using Deep Neural Networks*
- M.S. in Electrical and Electronics Engineering, Middle East Technical University 2018
  Thesis title: *Geospatial object recognition using deep networks for satellite images*
- Minor Degree in Aerospace Engineering, Middle East Technical University 2015
- B.S. in Electrical and Electronics Engineering, Middle East Technical University
  2014

Publications/Presentations

- "Malware Detection for Portable Executables Using a Multi-input Transformer-Based Approach ", 2024 (https://doi.org/10.1109/ICNC59896.2024.10556067)
- "AWS Compute Video Super-Resolution powered by the Intel® Library for Video Super Resolution", 2024 (https://doi.org/10.1145/3638036.3640290)
- "Universal Network Traffic Analysis for Malicious Traffic Detection using RappNet: A Privacy-Preserving Approach: IEEE CNS 23 Poster", 2023 (https://doi.org/10.1109/CNS59707.2023.10289115)
- "A Comprehensive Study on Efficient and Accurate Machine Learning-Based Malicious PE Detection", 2023 (https://doi.org/10.1109/CCNC51644.2023.10060214)
- "Weakly supervised learning for network traffic classification", 2022 (https://doi.org/10.1109/NAS55553.2022.9925450)
- "R1DIT: Privacy-Preserving Malware Traffic Classification with Attention-Based Neural Networks", IEEE Transactions on Network and Service Management, 2022 (https://doi.org/10.1109/TNSM.2022.3211254)
- "Multi-Task Hierarchical Learning Based Network Traffic Analytics", 2022 (https://doi.org/10.1109/ICC42927.2021.9500546)
- "Machine learning based malware detection on encrypted traffic: A comprehensive performance study", 2022 (https://doi.org/10.1145/3428363.3428365)
- "TLS Encrypted Application Classification Using Machine Learning with Flow Feature Engineering", 2022 (https://doi.org/10.1145/3442520.3442529)
- "NetML: A challenge for network traffic analytics", 2020 (https://arxiv.org/pdf/2004.13006)
- "Multitask LSTM Model for Human Activity Recognition and Intensity Estimation Using Wearable Sensor Data", IEEE Internet of Things Journal, 2020 (https://doi.org/10.1109/JIOT.2020.2996578)
- "Geospatial object detection using deep networks", 2019 (https://doi.org/10.1117/12.2530027)