Yavuz Yarici

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Education

Georgia Institute of Technology — Atlanta, US
Ph.D. in Electrical and Computer Engineering ***3.90/4.00*** — *Aug 2022 – present*

Bilkent University — Ankara, Turkey
B.S. in Electrical and Electronic Engineering ***3.95./4.00 - (in the top 4% of cohort)*** — *Oct. 2017 – May 2022*

Publication

- Y. Yarici, K. Kokilepersaud, M. Prabhushankar, G. AlRegib, "Explaining Representation Learning with Perceptual Components," in 2024 IEEE International Conference on Image Processing (ICIP), Abu Dhabi, United Arab Emirates (UAE), 2024.
- K. Kokilepersaud,Y. Yarici, M. Prabhushankar, G. AlRegib, "Taxes Are All You Need: Integration of Taxonomical Hierarchy Relationships into the Contrastive Loss," in 2024 IEEE International Conference on Image Processing (ICIP), Abu Dhabi, United Arab Emirates (UAE), 2024.
- K. Kokilepersaud, M. Prabhushankar, Y. Yarici, G. AlRegib, and A. Parchami, "Exploiting the Distortion-Semantic Interaction in Fisheye Data," in Open Journal of Signals Processing, Apr. 28, 2023.
- Mohit Prabhushankar, Kiran Kokilepersaud, Jorge Quesada, Yavuz Yarici, Chen Zhou, Mohammad Alotaibi, Ghassan AlRegib, Ahmad Mustafa, Yusufjon Kumakov. "CRACKS: Crowdsourcing Resources for Analysis and Categorization of Key Subsurface faults." (2024).

Experience

OLIVES Lab at Georgia Tech — Aug 2022 – Present
Graduate Research Assistant Supervised by ***Ghassan Alregib*** *(Machine Learning)* — *Atlanta, Georgia, US*

- Developed **Multi-Model Machine Learning** systems for Daily **Human Activity Recognition** by fusing multiple data modalities from wearable and environmental sensors achieving increased recognition performance.
- Designed a method to exploit the **hierarchical** structure of Multi-model data achieving increased performance of machine learning models.
- Developed a novel **XAI** method to explain **Computer Vision** model decisions based on the image's color, texture, and shape components, enhancing the interpretability and transparency of model outputs.
- Designed a **Contrastive Learning-based** approach to mitigate **Object Detection** performance degradation in **Autonomous Vehicle** fisheye cameras, enhancing reliability in challenging environments.

Hyperbee AI — Jan 2022 – Aug 2022
Research Engineer (Computer Vision) — *San Francisco Bay Area , US*

- Engineered and optimized lightweight **Object Detection** and recognition models for small platforms, including mobile and embedded devices, ensuring high performance under resource constraints.
- Designed and implemented a full speech-to-text, text correction, and question-answering pipeline tailored for mobile devices. Leveraged **AWS** services (SageMaker, EC2) for scalable development and deployment in a cloud-integrated environment.

Nurol Machine — Aug 2021 – May 2022
Part Time Research Engineer — *Ankara, TR*

- Developed an application with GUI for real-time **Object Detection** using novel deep learning methods and stereo vision **Depth Estimation** for tactical wheeled vehicles.(Link)

ICON (Imaging and Computational Neuroscience) Lab — May 2020 – May 2022
Undergraduate Researcher under the supervision of Prof. Tolga Cukur — *Ankara, Turkey*

- Developed a **Deep Learning (CNN+LSTM)** method for classifying motor response to visual stimulation.
- Engineered an encoding model leveraging contextual **NLP** techniques to predict fMRI responses to natural language stimuli, contributing to insights on the effects of visual stimulation on the human brain.

Selvi Technology — June 2020 – July 2020
Summer Intern — *Ankara, Turkey*

- Developed an autonomous drone control system using **ROS**, delivering enhanced stability and performance. Optimized flight control algorithms to ensure robust navigation in dynamic environments.

Skills

Key Skills: Machine Learning, Computer Vision, Image Processing, , Large Language Models, Self-Supervised Learning, Speech Recognition, Statistical Modeling, Feature Engineering
Programming Languages: Python, MATLAB, C++, R, Assembly (8051), VHDL, Mbed, Arduino
Frameworks, Tools and Libraries: Pytorch, Tensorflow, Keras, OpenCV, HuggingFace, SpeechBrain, AWS (Sagemaker, EC2, S3), ROS, Git, LaTeX

Research Interest

Machine Learning, Computer Vision, Self-Supervised Learning, Explainable AI, NLP

Projects

Analyzing and Predicting Earthquakes in Turkey | *Python, PyTorch* Jan 2023 - May 2023

- Earthquake forecasting and magnitude prediction using various machine learning models with historical earthquake data

Analysis of Different Energy Formulations for Optical Flow | *Python, OpenCV* Jan 2023 - May 2023

- Theoretical and quantitative analysis of different energy formulations for optical flow

Deep-Map Industrial Design Senior Project | *Python, OpenCV, PyTorch* Aug 2021 - May 2022

- Stereo vision depth estimation with two cameras and real-time object detection using novel deep learning methods with a group of six, Jointly conducted with industrial Turkish Defense Company, Nurol Makina. (Link)

Simulating Routing Protocols for Asymmetric Links | *MATLAB* Aug 2021

- Existing routing protocols for asymmetric links are simulated and their performances are evaluated in MATLAB. Alternative methods to overcome the asymmetric link problem are proposed

Human Activity Recognition with Smartphones | *Python* May 2021

- Human activities are classified using different statistical methods such as support vector machine, K-Nearest Neighbor and Softmax Regression.

Peer-to-Peer Network Application | *Python* April 2021

- Implementation of a Peer-to-Peer application that constructs the necessary overlay network and floods the network with information using the TCP communication standard between pairs.

Autonomous Drone Control | *ROS, Python* June 2020

- Drone is controlled in the simulation using ROS environment and landed on April Tag autonomously

Floor Cleaning Robot | *Mbed, C++* January 2020

- Autonomous and Bluetooth controlled floor cleaning robot implemented on Mbed Freedom KL25Z. The robot scans the room by using distance sensors and cleans it with water and sponge autonomously.

TRC 10 December 2019

- Implementation of Transceiver and receiver that work with AM in 28 MHz frequency.

FPGA Based Paint | *FPGA, VHDL, Arduino* May 2019

- VHDL based and Android App controlled (sends data via Bluetooth) drawing program implemented on Basys3. As the user draws on the tablet pc touchscreen, the picture is displayed on the VGA screen.
  Demonstration of the project is available at: (Link)

Languages

Languages: Turkish (Native), English (Professional Working Proficiency)

Honors and Awards

- **ON Semiconductor Fellowship (2022 - 2023)** Accepted to Georgia Tech with special fellowship for exceptional success
- **High Honour Student (2018 - 2022)**:High Honour Student in Bilkent University
- **269th in Nationwide University Entrance Exam (2017)**: Ranked 269th among 2 million students (LYS)
- **BIDEB Scholarship (TUBITAK 2205) (2017-Present)**: Scholarship for National Physics Olympiad medal holders
- **Comprehensive Scholarship of Bilkent University (2017 - Present)** : Scholarship for Exceptional Success in University Entrance Exam
- **Silver Medal(2016)**: 23rd TUBITAK (Scientific and Technological Research Council of Turkey) National Physics Olympiad
- **2nd in National High School Research Projects Competition (2016)**:Ranked 2nd in 47. national TUBITAK high school research project competition in physics