

CAT P. LE

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EDUCATION

Duke University Durham, NC
Ph.D., Electrical and Computer Engineering May 2023
Research: *Machine Learning, Computer Vision*
Thesis: *Task Affinity and Its Applications in Machine Learning*
Advisor: Dr. Vahid Tarokh

California Institute of Technology Pasadena, CA
M.S., Electrical Engineering June 2017
GDP: 4.00
Advisor: Dr. Babak Hassibi

Rutgers University – New Brunswick New Brunswick, NJ
B.S., Electrical and Computer Engineering May 2016
GDP: 4.00
Honors: *Summa Cum Laude, Matthew Leydt Society, John B. Smith Award, Outstanding Engineering Scholar, E. M. Toomey Scholarship, Tau Beta Pi, Eta Kappa Nu*

PROFESSIONAL EXPERIENCE

Amazon – Alexa Natural Understanding Arlington, VA
Research Scientist June 2022 – September 2022

- Analyzing the open-domain dialogs via sentiment analysis, response relevance, response specificity, and text classification.
- Designing the feature extraction frameworks to utilize the relevant features from the open-domain dialogs for customer rating prediction.
- Developing a novel open-domain dialog evaluation system, based on BERT, LSTM, and causal inference analysis. The model is trained to predict the ratings from the customers and experts.
- Applying causal inference in the open-domain dialog evaluation system helps improve the flexibility and prediction performance of the model.

Motorola Solutions Dallas, TX
Software Engineer June 2017 – August 2018

- Developing a Camera Shutter Synchronization System with LED Strobing for the license plate recognition cameras.
- Optimizing the Optical Character Recognition (OCR) algorithm of the license plate recognition cameras.
- Improving the energy consumption and the detection performance of the license plate and facial recognition cameras.
- Developing the firmware for the license plate and facial recognition cameras.

RESEARCH EXPERIENCE

Duke University

Durham, NC

Postdoctoral Research Associate

May 2023 – Present

- Developing a time-series prediction model using Transformer-Attentional Copulas for Time Series (TACTis) and Large-Language Model (LLM).
- Utilize this prediction model as a detection system for malfunction of mechanical parts in airplanes.

Duke University

Durham, NC

Graduate Research Fellow

August 2018 – May 2023

- Developing a novel task affinity based on Fisher Information matrices and maximum bipartite matching algorithm.
- The task affinity indicates the complexity of transferring the knowledge of a task to another. It is non-commutative and invariant to label permutation.
- Designing frameworks to apply task affinity in Neural Architecture Search, Transfer Learning, Few-Shot Learning, Continual Learning, Multi-Task Learning, Causal Inference, and Image Generative Models.

California Institute of Technology

Pasadena, CA

Graduate Research Fellow

September 2016 – June 2017

- Designing the framework to understand the American sign language using the NASA Jet Propulsion Laboratory (JPL) Sleeve, which receives the signals from 20 hand muscles and maps them into the alphabet.
- Developing the real-time musical note detector, using FPGA, and FFT.

Rutgers University

New Brunswick, NJ

Undergraduate Research Assistant

August 2015 – May 2016

- Developing the Radio Access Network under the REU Funding Program of the National Science Foundation (NSF).
- Designing a simulation with three OpenAirInterface base stations, using USRP B210, which is capable of allocating resources according to users' demands.
- Evaluating the data transmission rate using the Spectrum, Waterfall, and Constellation plots with varying bandwidths.

WINLAB

North Brunswick, NJ

Research Assistant

May 2015 – August 2015

- Developing the framework for Wi-Fi, LTE, and LTE in the Unlicensed Spectrum.
- Design a simulation of the LTE's base station (eNB) and users (UEs) using USRP B210 with the OMF and OpenAirInterface repositories.
- Evaluating the data transmission rate using the Spectrum, Waterfall, and Constellation plots with varying bandwidths.

TEACHING EXPERIENCE

Duke University

Durham, NC

- ECE 590 - Introduction to Deep Learning
- ECE 681 - Pattern Classification and Recognition Technology

California Institute of Technology

Pasadena, CA

- APh/EE 9 - Solid-State Electronics for Integrated Circuits

Rutgers University

New Brunswick, NJ

- 14:332:346 - Digital Signal Processing

PUBLICATIONS

- C. P. Le, L. Dai, M. Johnston, Y. Liu, M. Walker, R. Ghanadan, “Improving Open-Domain Dialog Evaluation with a Causal Inference Model,” in Diversity in Dialogue Systems, IWSDS, 2023. **Best Paper Award Runner-Up.**
- C. P. Le, J. Dong, M. Soltani, and V. Tarokh, “Few-Shot Continual Learning for Generative Adversarial Networks,” submitted to NeurIPS 2023.
- A. Aloui, J. Dong, C. P. Le, and V. Tarokh, “Counterfactual Augmentation for Individual Treatment Effect Estimation,” submitted to NeurIPS 2023.
- A. Aloui, J. Dong, C. P. Le, and V. Tarokh, “Transfer Learning for Individual Treatment Effect Estimation,” in Uncertainty in Artificial Intelligence (UAI), PMLR, 2023.
- C. P. Le, J. Dong, M. Soltani, and V. Tarokh, “Task Affinity with Maximum Bipartite Matching in Few-Shot Learning,” in International Conference on Learning Representations (ICLR), 2022.
- C. P. Le, M. Soltani, J. Dong, and V. Tarokh, “Fisher Task Distance and Its Applications in Neural Architecture Search and Transfer Learning,” in IEEE Access 10, 2022.
- C. P. Le, M. Soltani, R. Ravier, and V. Tarokh, “Task-Aware Neural Architecture Search,” in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2021.
- C. P. Le, M. Soltani, R. Ravier, and V. Tarokh, “Improved Automated Machine Learning from Transfer Learning,” in CoRR, 2021.
- C. P. Le, Zhou, Y., Ding, J., and V. Tarokh, “Supervised Encoding for Discrete Representation Learning,” in IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 2020.

HONORS & AWARDS

- **Matthew Leydt Society** – Rutgers University 2016
Top 1% Highest-Achieving Graduates of the Class of 2016
- **Outstanding Engineering Scholar** – Rutgers University 2016
The Highest Cumulative GPA Graduate in the School of Engineering
- **John B. Smith Award** – Rutgers University 2016
The Highest-Ranking Graduate in the Department of Electrical Engineering
- **Nikola Tesla Scholar** – Columbia University 2016
- **E. M. Toomey Scholarship** – Rutgers University 2015

PROFESSIONAL AFFILIATIONS AND HONOR SOCIETIES

IEEE – Signal Processing Society	2020 – Present
The Institute of Electrical and Electronics Engineers (IEEE)	2018 – Present
Sigma Alpha Pi	2016 – Present
Eta Kappa Nu	2015 – Present
Tau Beta Pi	2015 – Present

SKILLS

- **Programming Language** – Python, C/C++, Matlab, Git, Numpy, Scipy, Scikit-learn, Pandas, Matplotlib, Seaborn, OpenCV, Tensorflow, Keras, Pytorch
- **ML Framework** – Transfer Learning, Continual Learning, Few-Shot Learning, Reinforcement Learning, Computer Vision, Neural Architecture Search, Natural Language Understanding

REFERENCES

- Prof. Vahid Tarokh (vahid.tarokh@duke.edu)
Professor, Duke University
- Prof. Babak Hassibi (hassibi@caltech.edu)
Professor, California Institute of Technology
- Prof. Yicheng Lu (ylu@ece.rutgers.edu)
Distinguished Professor, Rutgers University