

Kyle Buettner

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PROFILE

- Machine learning researcher currently studying computer vision, domain robustness, contrastive learning, and multimodal learning in pursuit of Ph.D. in Intelligent Systems (Applied AI) at the University of Pittsburgh
- Over 3 years of experience contributing as part of AI-focused companies and machine learning research groups

INDUSTRY EXPERIENCE

GatherAI – Pittsburgh, USA

Machine Learning Intern

May 2021 – Aug 2021, May 2022 – Aug 2022

- Engineered and deployed an image filtering and merging pipeline that led to *>3x reduction in error of box counting analytics* captured from drones and delivered to customers
- Significantly contributed to vision-based TiHi functionality to expand logistics-based metrics offered to customers
- Maintained, evaluated, and frequently deployed improved machine learning models to production
- Regularly labeled and experimented with data for vision tasks (object detection, instance/semantic segmentation)

UPMC Enterprises – Pittsburgh, USA

Software Engineering Intern

June 2018 – Aug 2018

- Designed NLP word cloud tools to visualize electronic health record domain ontologies and enhance the productivity of the company's knowledge engineering department (*process time moved from hours to minutes*)

EQT Corporation – Pittsburgh, USA

Reservoir Engineering Intern

May 2017 – Aug 2017

- Composed economic decline curve models with new Excel toolset, providing new analytics to engineering team

SKILLS

- **Areas:** Artificial Intelligence, Computer Vision, Machine Learning, Deep Learning, Natural Language Processing, Domain Robustness, Multimodal Learning, Software Development, High-Performance Computing
- **Programming Languages:** Python, C++, C, R, Java, MATLAB, OpenMP, MPI, CUDA, OpenCL, VHDL, Linux
- **AI, Computer Vision, and NLP Libraries:** TensorFlow, PyTorch, OpenCV, SciKit-Learn, Pandas, NumPy, Matplotlib, SpaCy, NLTK, Whoosh, Nengo, SNN-Toolbox, Detectron2, MMDetection, NetworkX
- **Software Engineering:** Git, Jupyter Notebook, Agile, Scrum

RESEARCH EXPERIENCE

University of Pittsburgh – Pittsburgh, USA

Ph.D. Student Researcher, Intelligent Systems

Sep 2021 – Present

Advisor: Adriana Kovashka

- Devised contrastive view design strategies to enhance object detection robustness to domain shifts, resulting in 1st author paper at AAAI Workshop on Practical Deep Learning in the Wild (*see publications*)
- Currently investigating how to improve detection robustness in multimodal (vision-language) pretraining with captions
- Gained significant familiarity with training state-of-the-art models (Faster R-CNN, ResNets, BERT, MoCo-v2) and datasets (COCO Objects/Captions, VOC, ImageNet)
- Enhanced methods for story understanding in video advertisements with feature exploration for climax and sentiment prediction models, improving state-of-the-art as 2nd author on BMVC paper (*see publications*)

M.S. Student Researcher, Electrical & Computer Engineering

Sep 2019 – Apr 2021

Advisor: Alan George

- Served as representative member of NSF SHREC (Center for Space, High-Performance, and Resilient Computing) to Intel Neuromorphic Research Community
- Conducted research highlighting strategies to optimize spiking neural network accuracy and energy efficiency on Intel Loihi neuromorphic chip
- Provided novel energy and latency comparisons between 1D-CNN-based heartbeat classifiers on Intel Loihi, Intel Neural Compute Stick 2, and Google Edge TPU neural network devices

- Received award for top computer engineering project at SHREC 2019 undergraduate research expo; Project: *FPGA Acceleration of BLASTn Word-Matching* (using Vivado HLS, OpenCL, Xilinx cards)
- Contributed to multiple conference publications and completed M.S. thesis (*see publications*)

PUBLICATIONS

- Buettner, Kyle and Adriana Kovashka. "Contrastive View Design Strategies to Enhance Robustness to Domain Shifts in Downstream Object Detection." To appear in *AAAI Workshop on Practical Deep Learning in the Wild*, 2023.
- Buettner, Kyle, and Alan D. George. "Heartbeat Classification with Spiking Neural Networks on the Loihi Neuromorphic Processor." *IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*, 2021.
- Buettner, Kyle. A Case Study in Practical Neuromorphic Computing: Heartbeat Classification on the Loihi Neuromorphic Processor. Master's Thesis. University of Pittsburgh, 2021.
- Langerman, David, Alex Johnson, Kyle Buettner, and Alan D. George. "Beyond FLOPs: CNN Performance Prediction with Critical Datapath Length." *IEEE High Performance Extreme Computing Conference (HPEC)*, 2020.
- Ye, Keren, Kyle Buettner, and Adriana Kovashka. "Story Understanding in Video Advertisements." *British Machine Vision Conference (BMVC)*, 2018.

EDUCATION

University of Pittsburgh – Pittsburgh, USA	<i>Sep 2021 – Present</i>
Doctor of Philosophy, Intelligent Systems	GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA	<i>Sep 2019 – Apr 2021</i>
Master of Science, Electrical and Computer Engineering	GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA	<i>Sep 2015 – Apr 2019</i>
Bachelor of Science, Computer Engineering	GPA: 3.94/4.00
<i>Honorable Mention for Top Computer Engineering Student</i>	

COURSEWORK

Graduate Coursework: Artificial Intelligence, Machine Learning, Theory of Computation, Information Storage and Retrieval, Various Computer Architecture Courses (Dependable, Parallel, GPU, and Neuromorphic), Applied Statistics, Natural Language Processing (*Spring 2022*)

Undergraduate Coursework: Computer Vision, Digital Design, Software Engineering, Algorithms

LEADERSHIP AND TEACHING ROLES

Pitt School of Computing & Information Outreach – Pittsburgh, USA	
<i>Video Game Design Volunteer</i>	<i>Oct 2021 – July 2022</i>
<ul style="list-style-type: none"> • Taught Scratch video game programming to elementary and middle school kids on Saturday mornings as part of the University of Pittsburgh's neighborhood commitment program • Developed curriculum to code a platformer video game and provided students an introduction to Python 	

University of Pittsburgh – Pittsburgh, USA	
<i>Teaching Assistant in Various Courses</i>	<i>Sep 2016 – Present</i>
<ul style="list-style-type: none"> • Dependable Computer Architecture, Business Calculus, Precalculus, Intro to Java, Human-Robot Interaction 	

West Mifflin Soccer – West Mifflin, USA	
<i>Coach</i>	<i>Aug 2018 – Aug 2021</i>
<ul style="list-style-type: none"> • Served as soccer coach in community, running practices and offseason workouts (at youth and high school levels) 	

NOTABLE PROJECTS

Covid-19 Search Engine Prototype	<i>Spring 2022</i>
<ul style="list-style-type: none"> • Contributed to design of information retrieval system in searching for relevant info about COVID-19 pandemic • Leveraged query likelihood statistical language model and Boolean model for text matching with COVID-19 corpus • Designed UI through Tkinter, implemented indexing through Whoosh library, used NLTK for text processing 	

Last Updated: 11-26-2022