Kyle Buettner

Pittsburgh, PA, USA | *Email:* buettnerkr@gmail.com | *Phone:* 412-973-9166 | *LinkedIn:* kyle-robert-buettner | *GitHub:* krbuettner | *Website:* https://krbuettner.github.io/ | Google Scholar

PROFILE

- Machine learning engineer and researcher currently studying how to make computer vision algorithms and systems more robust as part of Ph.D. in Intelligent Systems (Applied AI) program at the University of Pittsburgh
- Over 4 years of experience as part of AI-focused companies and research groups, with impactful contributions made through machine learning research, software engineering, and data analysis projects
- Seeking a 2023 summer internship opportunity to solve unique and important problems in applied artificial intelligence

INDUSTRY EXPERIENCE

GatherAI – Pittsburgh, USA

Machine Learning Intern *May 2021 – Aug 2021, May 2022 – Aug 2022*

- Expanded company's drone-derived, inventory analysis offerings through significant R&D on *new* vision-based TiHi counting pipeline (*beta improved from 70% to 90% accuracy on evaluation sets*)
- Designed a Python-based image filtering and merging pipeline that resulted in *>3x reduction in error of box detection analytics* delivered to customers
- Frequently deployed improved machine learning models to production following statistical analysis of performance
- Regularly labeled and created datasets for vision tasks (object detection, instance and semantic segmentation)

UPMC Enterprises – Pittsburgh, USA

Software Engineering Intern on the NLP Team *June 2018 – Aug 2018*

- Engineered NLP word cloud tools in Java 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 predictive economic decline curve modeling tool with Excel, enabling new analysis to guide engineering team

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*)

SKILLS

- **General Areas:** Artificial Intelligence, Computer Vision, Machine Learning, Deep Learning, Natural Language Processing, Statistical Data Analysis, Software Development, High-Performance Computing, Parallel Programming, Predictive Modeling
- **Programming Languages:** Python, C++, C, R, Java, MATLAB, CUDA, OpenCL, OpenMP, MPI, VHDL, Linux
- **Machine Learning 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

EDUCATION

University of Pittsburgh – Pittsburgh, USA *Sep 2021 – Present (Expected Graduation: Dec 2024 or Apr 2025)*
Doctor of Philosophy, Intelligent Systems GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA *Sep 2019 – Apr 2021*
Master of Science, Electrical and Computer Engineering GPA: 4.00/4.00
University of Pittsburgh – Pittsburgh, USA *Sep 2015 – Apr 2019*
Bachelor of Science, Computer Engineering GPA: 3.94/4.00
**Honorable Mention for Top Computer Engineering Student*

COURSEWORK

Graduate Coursework: Artificial Intelligence, Machine Learning, Theory of Computation, Statistical Methods, Information Storage & Retrieval, Computer Architecture (Dependable, Parallel, GPU, Neuromorphic), Natural Language Processing *(Spring 2022)*
Undergraduate Coursework: Computer Vision, Digital Design, Software Engineering, Algorithms

NOTABLE PROJECTS

Covid-19 Search Engine Prototype *Spring 2022*

- Contributed to design of information retrieval system to search for relevant info about COVID-19 pandemic
- Leveraged query likelihood statistical language model and Boolean model for text matching with CORD-19 corpus
- Designed UI through Tkinter, implemented indexing through Whoosh library, used NLTK for text processing

Paint-By-Numbers Canvas Generator *Spring 2021*

- Developed image processing pipeline with OpenCV and Python for creation of a “paint-by-numbers” canvas
- Explored GPU/PyCUDA acceleration of color quantization, median filtering, & edge/contour detection (*2.6x app speedup*)

LEADERSHIP AND TEACHING ROLES

Video Game Design Volunteer, **Pitt School of Computing & Information Outreach – Pittsburgh, USA** *Oct 2021 – July 2022*

- Taught video game design lessons to kids as part of the University of Pittsburgh’s neighborhood commitment program
- Designed a new Python curriculum, further expanding kids’ familiarity with practical computer science skills

Sports Coach, **West Mifflin Soccer – West Mifflin, USA** *Aug 2018 – Aug 2021*

- Served as soccer coach in community, running practices and offseason workouts (at youth and high school levels)

Teaching Assistant in Various Courses, **University of Pittsburgh – Pittsburgh, USA** *Sep 2016 – Present*

- Dependable Computer Architecture, Business Calculus, Precalculus, Intro to Java, Human-Robot Interaction

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.