Kyle Buettner

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EDUCATION

University of Pittsburgh – Pittsburgh, USA *Sep 2021 – Present*
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

RESEARCH EXPERIENCE

University of Pittsburgh – Pittsburgh, USA
Ph.D. Student Researcher, Intelligent Systems *Sep 2021 – Present*
Advisor: Adriana Kovashka

- Explored strategies to enhance the robustness of object detection models during self-supervised pretraining
- Experimented with various datasets (COCO, VOC, ImageNet) and models (Faster R-CNN, ResNets, MoCo-v2)
- Submitted publication (in review) highlighting novel strategies to build visual robustness into contrastive learning
- Currently investigating the role of visual and linguistic contextual biases in vision-language pretraining

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)
- Completed conference publication and M.S. thesis (see publications)

INTERNSHIPS

GatherAI – Pittsburgh, USA
Machine Learning Intern *May 2021 – Aug 2021, May 2022 – Present*

- Engineered and deployed an image filtering and stitching pipeline that led to *>3x reduction* in error of box counting analytics delivered to customers
- Contributed to CV-based functionality that expanded drone-gathered metrics offered to customers (TiHi)
- Frequently experimented with various vision tasks and models (object detection, semantic segmentation)

UPMC Enterprises – Pittsburgh, USA
Software Engineering Intern *June 2018 – Aug 2018*

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

EQT Corporation – Pittsburgh, USA
Reservoir Engineering Intern *May 2017 – Aug 2017*

- Designed economic decline curve model in Excel, increasing analytics available to engineering department

LEADERSHIP AND TEACHING ROLES

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

- Taught Scratch video game programming to elementary school kids on Saturday mornings as part of the University of Pittsburgh's neighborhood commitment program
- Performed analysis of Kahoot question performance to evaluate and improve learning outcomes of students

University of Pittsburgh – Pittsburgh, USA
Teaching Assistant in Various Courses *Sep 2015 – Present*

- Dependable Computer Architecture, Business Calculus, Precalculus, Intermediate Programming using Java

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

- Served as assistant soccer coach at high school level for 4+ years, running practices and offseason workouts
- Coached teams of kids ages 6-12 in youth soccer league (various seasons)

PUBLICATIONS

- 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 Floating-Point Ops: 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.

COURSEWORK

Graduate Coursework: Artificial Intelligence, Machine Learning, Theory of Computation, Information Storage and Retrieval, Various Computer Architecture Courses (Dependable, Parallel, GPU, and Neuromorphic)
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 in searching 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 for creation of a "paint-by-numbers" canvas
- Used OpenCV to perform color quantization, median filtering, edge detection, and contour detection
- Parallelized operations on GPUs using PyCUDA

SKILLS

Programming: Python, C++, C, Java, MATLAB, OpenMP, MPI, CUDA, OpenCL, VHDL, UNIX/Linux
AI, Computer Vision and NLP Libraries: TensorFlow, PyTorch, OpenCV, Scikit-Learn, Pandas, NumPy, Matplotlib, NLTK, SpaCy, Whoosh, Nengo, SNN-Toolbox, Detectron2, MMDetection
Software Engineering: Git, Jupyter Notebook, Agile, Scrum

Last Updated: 5-14-2022