JACOB TYO

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SELECTED PROFESSIONAL EXPERIENCE

U.S. Army Research Laboratory – Remote out of Adelphi, MD Aug 2018 – Present

Machine Learning Engineer/Researcher

- Develop and present on novel applications of deep learning in computer vision and natural language processing.
- Maintain TS/SCI security clearance required for classified R&D initiatives.
- Consult on artificial intelligence research projects while concurrently pursuing PhD at CMU.

Electronics Engineer Jan 2017 - Aug 2018

- Served as key technical lead for international urban combat challenge; coordinated integration of 15 multi-national systems and liaised with senior defense officials for this massive project.
- Led field testing and performance analysis of new signal processing equipment and data fusion systems; authored detailed test reports to evaluate capabilities.
- Worked cross-functionally to develop high-throughput, asynchronous system integrations with various external organizations. Built expansive multilanguage systems with vast functionality to enable large-scale demonstrations, experiments, and capability evaluations.

Performance Photo – Remote out of Pittsburgh, PA April 2023 – Nov 2023

CEO/Founder/Director of Artificial Intelligence

- Created and launched an AI-powered platform from scratch to enable robust image search and automated tagging in extreme conditions, increasing search accuracy by 45% (~ 3x improvement).
- Built from the ground up, assembled a team of 6 engineers to develop proprietary computer vision and NLP models. (https://www.performancephoto.co/)
- Architected scalable cloud infrastructure on AWS supporting over 1M photos and kept costs near zero.
- Identified and executed marketing strategies and partnerships to acquire users and establish brand recognition in the motorsports photography industry.

West Virginia University - Morgantown, WV March 2016 – Dec 2016

Graduate Research Assistant - Advisor: Dr. Katerina Goseva-Popstojanova

- Developed a natural language processing system to analyze security vulnerabilities in issue tracking platforms for NASA using supervised and unsupervised learning techniques.
- Engineered feature extraction pipelines to identify keywords and patterns indicative of different vulnerability types from unstructured text data.

West Virginia University - Morgantown, WV May 2015 – Mar 2016

Graduate Research Assistant - Advisor: Dr. Roy Nutter

- Developed a system to measure an individual's internet exposure and digital footprint using facial recognition and information retrieval techniques.
- Engineered pipelines to gather and rank images and personal data from the web.
- Implemented computer vision algorithms to match facial images despite variations like lighting, pose, and age.

EDUCATION

Carnegie Mellon University

Doctor of Philosophy in Machine Learning - Advisor: Zachary C. Lipton May 2024 (Expected)

- Research focuses on computer vision, natural language processing, meta-learning and reinforcement learning.
- Developed novel data augmentation strategies to improve model robustness to extreme conditions like mud for text spotting and person re-identification.
- Created new meta-learning techniques to enable better risk management and uncertainty quantification for deep networks.
- Introduced contrastive learning for multiple instance problems, improving learning from weakly labeled datasets.
- Founder of an AI startup applying latest advancements to real-world problems.
- System Administrator, HPC Lead, Website develope/maintainer, for ACMI Lab (https://acmilab.org/).

West Virginia University
Master of Science and Bachelor of Science in Electrical Engineering Dec 2016

- Research focused on machine learning techniques for cybersecurity and vulnerability detection.
- Developed natural language processing models to identify and classify security issues from text data.
- Graduated Magna Cum Laude with a thesis on automating vulnerability detection from issue tracking systems.

SELECTED SKILLS/TECHNOLOGIES

Machine Learning: Python, Pytorch, Numpy, SciKit-Learn, Pandas, Vector Databases, LLMs, WandB, MLFlow, Huggingface, SimpleTransformers, Spark
Cloud: AWS, Serverless, Kubernetes, Kubeflow, Lambda, Sagemaker, Amplify, Cognito, Datadog
General: Git, Github, Docker, Singularity, SLURM, Java, SQL, NoSQL, Angular, JavaScript, Linux, Django
Soft: Communication, Teamwork, Leadership, Public Speaking

SELECTED PUBLICATIONS

(Preprint) Jacob Tyo, Evan Fellman, Zachary C. Lipton. “Visual vs Code: Unveiling Events and Robust Web Scraping with LLM’s.” (2023)

(Preprint) Jacob Tyo*, Motolani Olarinre*, Youngseog Chung, Zachary C. Lipton. “MUDD: A New Re-Identification Dataset with Efficient Annotation for Off-Road Racers in Extreme Conditions.” (2023)

(Preprint) Jacob Tyo*, Youngseog Chung*, Motolani Olarinre, Zachary C. Lipton. “Reading Between the Mud: A Challenging Motorcycle Racer Number Dataset.” (2023)

(Preprint) Jacob Tyo, Zachary C. Lipton. “Meta-Learning Mini-Batch Risk Functionals.” arXiv preprint arXiv:2301.11724 (2023).

Jacob Tyo, Bhuwan Dhingra, and Zachary C. Lipton. "VALLA: Standardizing and Benchmarking Authorship Attribution and Verification Through Empirical Evaluation and Comparative Analysis." In Proceedings of the 13th International Joint Conference on Natural Language Processing and the 3rd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics (IJCNLP-AACL 2023).

Benjamin Eysenbach*, Jacob Tyo*, Shane Gu, Ruslan Salakhutdinov, Zachary Lipton, Sergey Levine, “*Reinforcement Learning with Unknown Reward Functions*,” ICLR 2019 SPiRL and TARL

Goseva-Popstojanova, Katerina, and Jacob Tyo. "*Identification of security-related bug reports via text mining using supervised and unsupervised classification.*" 2018 IEEE International Conference on Software Quality, Reliability and Security (QRS). IEEE, 2018.