

Research Statement

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My endgame is fundamentally simple: to relentlessly pursue every question that I have for the entirety of my life. Simultaneously the most rudimentary and conclusive description I could think of, it's the fulcrum to a train of thought that stretches between and far beyond the millions of researchers that Google Scholar can index. It hosts the tiny sliver of the world we call the bleeding edge, and I'd like desperately to be a part of it.

To that effect, I am deeply motivated towards pursuing research under a relatively wide range of disciplines, specifically: Machine Vision, Computer Graphics, Reinforcement Learning, Language Interpreters, Machine Interpretability and Natural Language Processing.

I have had collaborations with faculty at CERN, developing CutLang: a domain-specific analysis description language for particle physicists conducting Large Hadron Collider (LHC) experiments. CutLang eases programming proficiency required to process raw data from experimental apparatus, allowing researchers to focus on their experiments and not have to invest time learning the ROOT Framework over C++. CutLang was presented at the 8th Annual Conference on Large Hadron Collider Physics, and has been peer-reviewed and published to Frontiers in Big Data in June 2021.

I have also published and presented research within Natural Language Processing, at the EVALITA conference in Italy. Alongside Gabriele Sarti, a current MSc Student at the University of Groningen, I developed ArchiMeDe: a model for meme classification implementing an ensemble of pre-trained frameworks utilizing both image and text based inputs to label images obtained from Italian social media meme accounts. ArchiMeDe was presented at the Final Workshop of the EVALITA conference, and was peer-reviewed and published to CEUR-WS in December 2020.

This semester, I begun pursuing research at the Applied Cryptography Research Lab at Purdue, under Prof. Christina Garman. We are developing simplistic methods to identify Cryptographic Algorithms in Binaries, with an objective to set a baseline for future research. My focus within the project is centered around evaluating past research such as CryptoKnight and CryptoHunt, and further using primitive techniques within NLP to produce our target baseline. I am also leading a publication-track project, partaking in Papers With Code's Reproducibility Challenge - my team is creating a Tensorflow re-implementation of Space-Time Convolutional Networks!

For Spring 2022, I will have the opportunity to participate in a graduate class in Computer Security covering binary exploitation and reverse engineering, under Prof. Antonio Bianchi. I am also scheduled to join the Duality Lab at Purdue, under Prof. James Davis in the following semester. We will create templates and sample implementations of recently published machine learning methods within computer vision using Tensorflow, merging our research with Google's model repository. Finally, I am excited to join the Q Learning and Vision Lab, under Prof. Qiang Qiu working on Image Object Detection using footage from Drone Video.

I've failed enough times to know that the binary tree we call the future can only be predicted upto a shallow depth before losing it's concreteness. Inspired by CGP Grey, my long term goal - intentionally ambiguous - is to explore every possible avenue within my field of choice; and to ensure I commit towards every responsibility I undertake, absolute perfection.