Callum Hepworth

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Education

University of British Columbia Vancouver, BC

Bachelor of Applied Science, Engineering Physics *Sept. 2018 – Present*

- Cumulative GPA: 4.00/4.33
- Projected Completion: December 2023

Work Experience

Teaching Assistant - Data Structures & Algorithms September 2022 – Present

University of British Columbia *Vancouver, UBC*

- Currently serving as a teaching assistant (TA) for CPSC 259 - Data Structures and Algorithms for Electrical Engineers
- Oversee twice-weekly 30-student lab sessions, providing guidance and mentorship on assignments assessing the fundamentals of data structures and algorithms

Machine Learning Research Intern July 2022 – August 2022

SLAC National Accelerator Laboratory *Menlo Park, CA*

- Expanded an existing data analysis framework in **Python** to concurrently parse and perform principal component analysis (PCA) at **120 Hz** on a **4-megapixel** image data set
- Explored existing solution landscape through a comprehensive literature review, correctly identifying incremental PCA (iPCA) as a method of promise
- Identified rate-limiting steps through performance benchmarking, parallelizing iPCA using the **MPI Message Passing Interface** to achieve a **100x increase** in update frequency

Software Developer Intern January 2020 – December 2020

Validus Research, Inc. *Waterloo, ON*

- Designed and expanded internal-facing web application in **Vue.js** to streamline analyst workflow, significantly reducing work overhead for the creation and maintenance of new and existing projects
- Developed UI and data pipeline allowing analysts to retrieve, format, and display analytics data from multiple sources, facilitating an intuitive comparison of varied client information
- Built **Flask API** in **Python** to allow for retrieval of relevant data from a **SQL** server, exporting formatted and cleaned project data to customized .xlsx file
- Returned after initial four month internship (January - April) on a part time basis starting in July 2020

Projects

Particle Simulation and Reconstruction | *Docker, Python, C* September 2021 – May 2022

- Developed user-facing **Python** wrapper for **Docker** deployed **C** program used to generate simulated datasets of particles imaged through cryogenic electron microscopy, improving runtimes to adequately handle large workloads
- Implemented iterative refinement algorithm to reconstruct simulated 2D datasets into 3D particles, leveraging academic literature to benchmark performance
- Upheld best software development practices, including maintaining a rigorous test suite in **pytest** with minimum **90%** code coverage, to facilitate extensibility of open-source project repository

Autonomous Robot Control | *Python, ROS, Deep Learning, Computer Vision* September 2020 – December 2020

- Using the **ROS** framework, developed a simulated robot in **Python** and **C++** capable of autonomously navigating a competition surface
- Designed an image capture algorithm to reliably record the license plates of passing vehicles, subject to a SIFT keypoint match threshold
- Planned and implemented a convolutional neural network using **TensorFlow** and **Keras** to classify characters from license plate images, achieving **99%** classification accuracy on test dataset

Technical Skills

Languages: Python, JavaScript, HTML/CSS, Java, C/C++
Technologies: ReactJS, VueJS, Flask, JUnit, OpenCV, MPI, Git