JACOB BREZINA

Carnegie Mellon University senior studying mathematics and computer science with professional experience in software development and machine learning

CONTACT

jbrezina@andrew.cmu.edu
240-682-1131
La Plata, MD

EDUCATION

Carnegie Mellon University
Graduating in May 2020
GPA: 3.44

Bachelor of Science
Computational and Applied Mathematics

Additional Major
Computer Science

LANGUAGES

Python, C++
Java, C, R

TECHNOLOGIES

SQL, Git, Bash
PyTorch, Scikit-learn
NumPy, OpenCV
RabbitMQ, Celery
Travis-CI, Gradle
Linux, Windows
Atlassian Tool Suite
AWS (EC2 + EMR)

SKILLS

Data Analysis
Statistics
Machine Learning
Agile Development
Object-Oriented Design
Debugging
UML

EXPERIENCE

Technical Aide // Johns Hopkins University Applied Physics Lab // Summer 2019

- Developed module of Instagram-like image filters in Python using Wand and OpenCV for use in synthetic data generation pipeline for open-source deep learning project
- Developed dynamic-programming algorithm for merging images within pipeline with over 100x speedup over existing brute-force approach

Technical Aide // Johns Hopkins University Applied Physics Lab // Summer 2018

- Performed development on robotic control software, which was met with approval by operators during end-user testing
- Developed new UI features in Node.js environment, including low battery indicators, loading screens and display brightness control
- Contributed back-end improvements in C++, including a bug fix for robotic manipulator control and a new shutoff protocol triggered by exceeding an allowed range between robot and operator

PROJECTS

Simple Defenses for Adversarial Attacks // Fall 2019

- Explored existing adversarial methods for attacking neural networks and developed simple defenses in PyTorch for reducing their effectiveness
- Adversarial attacks considered included the Fast Gradient Sign Method, DeepFool and a variant of the one pixel attack
- Defensive methods developed consisted of simple input transformations during training, including gaussian noise and dropout/random pixel saturation

Distributed Reverse Image Search // Spring 2019

- Developed a distributed system for finding similar images within a dataset in Python using RabbitMQ and Celery
- Query image is preprocessed using a neural network and then sent to worker instances, where approximate nearest-neighbor searches are performed in parallel on corresponding portions of the dataset using kd-trees

Carcassonne Board Game // Spring 2019

- Created an application simulating the Carcassonne board game in Java using Swing framework
- Includes many helpful UI features, including the highlighting of valid moves and a resizeable board