Bob Wei

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Skills

Languages Python, C/C++, CUDA C++, Golang, Java, JavaScript, Objective-C, Swift, C#, Scala, SQL, LateX

Technologies Pytorch, TensorFlow, Docker, Unity3D, OpenCV, Postgres, Mongo, Django, Node.JS, Unix, Git, Google-Cloud

Experience

Nvidia
Santa Clara, CA

Research Engineer Intern - Computer Vision *June 2020 - September 2020*

- Rethinking the low-level object detection pipeline on the autonomous vehicles team
- Reduced object detection post-processing time from **7ms** to **1.7ms** in **C++** production codebase for Tegra autonomous systems. Implemented novel probabilistic voting method with efficient **CUDA** kernels, replacing current state-of-the-art
- Proposed a novel scale-invariant loss for poly-line detection, increasing F1 score by > **5%**
- Integrated scale-invariant loss functions in **Tensorflow** multi-task training, improving bounding box fscore by > **3%**
- Formulated prototypes for uncertainty-aware training and point-based box detection

Uber Advanced Technologies Group
Toronto, ON

Machine Learning Research Intern *September 2019 - May 2020*

- First authored a paper under review for **IEEE ICRA 2021** (*arxiv.org/abs/2011.01153*); supervised by **Dr. Raquel Urtasun**.
- Spearheaded the research and development of a novel, end-to-end neural network for vehicle motion planning, making use of spatial attention mechanisms to focus computation, improving performance on planning metrics and efficiency
- Implemented deep learning, computer vision, and data manipulation algorithms using **Pytorch** and **CUDA C**

Side Effects Software
Toronto, ON

Software Developer Co-op *January. 2019 - April. 2019*

- Designed an interactive terrain generation tool, mapping simple 2D sketches to realistic 3D height-field assets
- Engineered a full **C++** and **Python** frontend/backend for training and deploying neural networks within **SideFX Houdini**
- Developed and tuned machine learning models (**cGAN**) to apply simulated erosion to high-res terrain assets, achieving similar results (>**95%** structural similarity) approximately **50,000×** faster than conventional erosion methods
- Created an asynchronous deployment pipeline for efficient hyper-parameter search

BlackBerry Messenger
Mississauga, ON

Software Developer Intern *May 2018 - August 2018*

- Redesigned user interface for BBM Channels and Official Accounts on iOS using **Objective-C** and **Swift**

Projects

Flow

uWaterloo Course Ratings + Reviews

- **uwflow.com** is the primary website for course related info and reviews at uWaterloo with over **25,000** monthly active users
- Built the backend infrastructure from the ground up with **Golang**, **Postgres**, and **Hasura** at the core
- Designed a new authentication flow supporting Facebook, Google, and Email login using **OpenID** and **Oauth 2.0** protocols

Agent Curiosity in Reinforcement Learning

github.com/bobqywei/curiosity-driven-exploration

- Exploration of current state-of-the-art methods for encouraging environment exploration in RL agents
- Implemented baseline **Advantage Actor-Critic** algorithms and various intrinsic curiosity formulations
- Demonstated much faster learning (>**3.0×**) in challenging **OpenAI Gym** environments with sparse rewards

Image Inpainting

github.com/bobqywei/inpainting-partial-conv

- Image editing tool for semantically-aware inpainting, removing undesired objects from images
- Implemented **UNet** model with partial convolutions based on Nvidia research, providing open-source **Pytorch** code

Education

University of Waterloo

Bachelor of Science in Honours Computer Science *September 2017 - Present*

- Cumulative GPA: **3.95/4.0** or **92%**