Bob Wei

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Skills

Languages Python, C/C++, CUDA C++, Golang, Java, JavaScript, Objective-C, Swift, C#, Scala, SQL, LateX
Frameworks Pytorch, TensorFlow, Docker, Unity3D, OpenCV, Postgres, Mongo, Django, Node.JS, Unix, Git, Google-Cloud

Experience

NVIDIA   *Santa Clara, CA (Remote)*
RESEARCH ENGINEER INTERN - COMPUTER VISION   *June 2020 - Present*

- 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, ready to be deployed in **Tegra** chip based autonomous systems. Implemented novel **probabilistic voting** with efficient **CUDA** kernels, replacing popular DBSCAN and NMS methods.
- Proposed a novel scale-invariant loss for poly-line detection, increasing F1 score by > **5%**
- Integrated scale-invariant task loss functions into the **Tensorflow** multi-task training infrastructure, improving bounding box F1 score by > **3%**
- Established proof-of-concepts and theory for **instance-uncertainty** aware training and **point-based** box detection

Uber Advanced Technologies Group   *Toronto, ON*
MACHINE LEARNING RESEARCH INTERN   *September 2019 - May 2020*

- Experimented with novel methods in the fields of **self-driving** and general **machine learning** (details under NDA)
- Spearheaded the research and development of an efficient, end-to-end **neural network** for vehicle motion planning
- First authored a paper submission under review at the upcoming **Neurips 2020** conference
- Implemented deep learning based computer vision algorithms using **Pytorch** and **CUDA C**

Side Effects Software   *Toronto, ON*
3D 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 qualitative and quantitative results (>**95%** structural similarity) approximately **50,000×** faster than conventional eroding tools
- Created an asynchronous deployment pipeling 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

- An exploration of current state-of-the-art techniques for encouraging increased environment exploration in **reinforcement learning**
- Implemented baseline **Advantage Actor-Critic** algorithms and various **intrinsic curiosity** formulations
- Demonstated and confirmed significantly faster learning (>**3.0×**) in challenging **OpenAI Gym** environments with sparse rewards

Image Inpainting
GITHUB.COM/BOBQYWEI/INPAINTING-PARTIAL-CONV

- Deep learning based 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   *Waterloo, ON*
BACHELOR OF SCIENCE IN HONOURS COMPUTER SCIENCE   *September 2017 - Present*

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