REZA ASAD

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Research Interests

Optimization in Machine Learning with Applications to Computer Vision and Graphics, 3D Scene Understanding and Generation.

Education

Simon Fraser University **Jan 2020 – present**
PhD in Computer Science, Visual Computing.

Simon Fraser University **Sept 2018 – Dec 2019**
Master's in Computer Science, Visual Computing.

University of British Columbia **Sept 2013 – Apr 2015**
Master's in Applied Mathematics (3 credits short).

University of Toronto **Sept 2010 – Apr 2013**
Honours Bachelor of Science with High Distinction in Mathematics.

Recent Research Experience

PhD Candidate, SFU **Jan 2020 – present**

- Developing an optimization algorithm that can interpolate between first and second-order optimizers. After each backward pass, the optimizer can be applied to each layer of a neural network independently and in parallel for several steps.
- Introduced the task of 3D subscene retrieval, extending prior work on 3D scene retrieval and context-based 3D object retrieval.
- Developed a self-supervised 3D point transformer (PointCrop) for the task of 3D subscene retrieval. Paper accepted to CVPR 2023 workshop (Structural and Compositional Learning on 3D Data).

Machine Learning Course Project, SFU **Oct 2018- Apr 2019**

- Won the best project award at SFU's 2018 AI Showcase organized by Dr. Greg Mori.
- Modified the loss function of the CycleGAN model in order to translate snowy and non-snowy satellite images while keeping cloud pixels intact. The modification led to significant improvements on Jaccard index and overall accuracy compared to CycleGAN.
- An extension of the project was accepted at IEEE ICIP 2019.

Publications

- **R. Asad**, M. Savva, "3DSSR: 3D Subscene Retrieval", accepted to **CVPR Workshop** (**Structural and Compositional Learning on 3D Data**), **2023**.

- **R. Asad**, A. Burchard, "Steiner Symmetrization Along a Certain Equi-distributed Sequence of Directions", **Arxiv 2020**.
- S. Mohajerani, **R. Asad**, K. Abhishek, N. Sharma, A. van Duynhoven, P. Saeedi, "CloudMaskGAN: A Content-Aware Unpaired Image-to-Image Translation Algorithm for Remote Sensing Imagery", accepted to **IEEE ICIP, 2019.**
- **R. Asad**, G. Simpson, "Embedded Eigenvalues and the Nonlinear Schrödinger Equation", accepted to the **Journal of Mathematical Physics, 2011**.

Honors and Awards

- CMPT Graduate Fellowship Award, 2020-2024 ($32000).
- Dean's Graduate Scholarship, 2020-2021 ($5000).
- British Columbia Graduate Scholarship (BCGS), 2020-2021 ($15000).
- Best project award at SFU's AI showcase, Simon Fraser University, Fall 2018.
- Undergraduate Student Research Awards (USRA) through Natural Sciences and Engineering Council of Canada (NSERC), University of Toronto, Summer 2012 ($6000).
- Exceptional Achievement Award, University of Toronto, 2011-2012 ($1000).
- Later Life Learning OSOTF Award, University of Toronto, 2011-2012 ($600).
- Fairfax Financial Award, University of Toronto, 2008-2012 ($20000).

Recent Professional Experience

Computer Vision Intern at Terramera, Vancouver **May 2019 – Aug 2019**

- Implemented a deep crowd counting model to count corn crops based on drone field images. The model achieved an accuracy of 99.96% on test data compared to 93% offered by competitor software. The model is used in a new product built by Terramera's software engineers.
- Implemented a model for segmenting phytotoxicity on plants. The model achieved an accuracy of about 95% on phyto and non-phyto pixels and is currently used by Terramera's biologists.

Data Scientist at Tamr, San Francisco Bay Area **Oct 2016 – Jun 2018**

- Built a classifier to categorize the manufacturing parts that General Electric purchases on a weekly basis (~17 million records). Developed custom pipelines using Tamr, Spark, Elasticsearch and PostgreSQL to automate the classification process. This resulted in GE saving $80 million dollars over 3 years according to fortune.com.
- Implemented an active learning framework to make the most out of the domain experts' time during the label acquisition phase of the project.

Technical Skills

- **Programming Languages:** Python (Numpy, PyTorch, OpenCV, Pandas), C++ (OpenCV), R, MATLAB
- **Tools:** PostgreSQL, Spark, Elasticsearch, Mongo DB, Kafka, Amazon EC2.