Matthew P. Kowal

Deep Learning | Computer Vision | Applied Statistics
Researcher & P. Eng Candidate

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Website & Blog - mkowal2.github.io/

An expert in deep learning, computer vision, and applied statistics. A dedicated and motivated lifelong learner, determined to make a positive impact on society by creating innovative solutions to complex problems. A motivating team member and reliable leader who has worked on multiple high-level engineering and research teams.

Selected Experience

NextAI (6 months)

AI Scientist in Residence | (March 2020 - Aug 2020)

- Consult funded startups (NextAI program) to help design and review AI based systems
- Provide support with respect to software and hardware technologies, tools, and platforms
- Provide R&D and software development services (software, hardware, tools, and platforms)
- Attend lectures in AI/Machine Learning to better consultation skills and review material

Morrison Hershfield (2 years)

Mechanical Designer EIT | (July 2017 - Aug 2018)

- Analysis and design of mechanical systems: controls, electrical, HVAC, hydro, fire protection.
- Projects: TTC McNicoll bus garage, University of Toronto physics lab, Pearson Airport, etc.

Structural Assistant | (May 2015/16 - Aug 2015/16)

- Bridge inspections in office and on-site.
- Half-cell testing, coring, deformation analysis.
- Soffit, deck and abutment mapping.

Research Assistant (1 year)

Prof. Jeff Lee, Baylor University | (July 2017 - Aug 2018)

- Assisted in research on relativistic properties of temperature, heat conduction, thermal diffusivity.

Academic Advisor (8 months)

Ryerson University | (April 2019 - Present)

- Meet with faculty to discuss specializations, course requirements, and mathematics in computer science.
- E.g., AI specialization added November 2019.
- Give lectures on academic advice for undergrads.

Teaching Assistant (4 months x5)

Ryerson University | (Jan 2019 - Present)

- Advanced Algorithms (x2) - CPS616: Tutorials and Labs
- Big Data Systems - CPS853: Labs and Assignments
- Machine Learning - CPS803: Assignments
- Computer Vision – CPS843: Assignments and Exams

Education

Ryerson University (M.Sc - Thesis Option)

Computer Science | (Sept 2018 - Present)

- Relevant courses: Deep Learning in Computer Vision, Machine Learning, Neural Information Processing, Reinforcement Learning.
- Specialization in deep learning, computer vision, video understanding, semantic segmentation, weakly and unsupervised learning.

Queen's University (B.A.Sc)

Applied Math and Engineering (aka 'Apple Math') | (Aug 2013 - May 2017)

- Relevant courses: Probability I & II, Calculus I, II, & III, Linear Algebra I & II, Optimization Theory, Differential Geometry, Modern Control Theory, Systems, Signals, Differential Equations, Real & Complex Analysis, Algebraic Structures
- Mechanical Engineering Minor
- Queen's Varsity Baseball – Pitcher + Infielder (Aug 2013 - May 2017)

Research Projects

Ryerson University

Weakly Supervised Semantic Segmentation

- Designed new method to produce semantic segmentation groundtruth from weak supervision.
- Significantly improves upon state-of-the-art for the task of weakly supervised semantic segmentation.

Multi-Modal Action Recognition Using 3D CNN's - (Thesis)

- Evaluation of input modalities for the task of action recognition using recent deep learning techniques.
- Improved upon state-of-the-art method by using additional modalities (e.g., depth, segmentation).
- Showed that current modality usage is non-optimal, suggesting research into new modalities is required.

Gene Fusion Tool Evaluation - (Accepted: Cancer AI & Big Data conference (poster))

- Collaboration with University of Toronto – Benjamin Haibe-Kains Lab.
- Evaluation of top gene fusion tools to assist practitioners for fusion-targeted cancer therapy.

Self-Supervised Uncertainty Estimation for Semantic Segmentation

- Designed new method for uncertainty estimation applied to semantic segmentation (applicable to any pixel-wise task with tractable error mask).
- Used ResNet-101 using custom designed CNN and intermediate activations as the input to predict error.

Queen's University

Eye Tracking in an Image Sequence for Driver Attention

- Designed eye tracking algorithm for the application of monitoring driver attention in automobiles using level set method to obtain optimal functional.

Baylor University (Remote Research)

Material Invariant Relativistic Properties

- Derived relativistic heat equation using black body radiation for inertial and non-inertial cases.

Programming & Frameworks

- Expert in Python, NumPy, PyTorch, Bash, Scikit-learn, TensorBoard, MatPlotLib, OpenCV, PIL
- Linux and OS backends
- Projects completed with TensorFlow, Keras, MATLAB, C, C++, R
- Data pre-processing, manipulation and extraction
- AutoCAD, Revit, and NS

Awards

Ontario Graduate Scholarship

- $15,000 payment over the course of one year in recognition of high academic standing (Accepted).

Keyser Award

- Awarded for best capstone project in discipline (Applied Mathematics and Engineering) Project: Eye Tracking in an Image Sequence for Driver Attention
- $1,000 single payment (Accepted)

Queen's Excellence Scholarship

- $2,000 annually over four years. Awarded upon grade based merit. (Accepted)