Matthew Kowal, B.A.Sc, M.Sc, Ph.D Student

Computer Vision Researcher

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Selected Experience

2021 – Present — **Technical Lead @ Vector Institute** - Lead a team of industry data-scientists computer vision project on video understanding.

2020 – Present — **Lead Scientist in Residence @ NextAI** - Lead technical consultant for AI-based startups. Provided support on the implementation of state-of-the-art deep learning algorithms for various industry applications.

2020 – 2021 — **Organizing Chair @ OWCV** - Co-founder and organizing chair of the Ontario Workshop on Computer Vision, a student-focused workshop for computer vision researchers in Ontario. OWCV Website.

2018 – Present — **Teaching Assistant** - TA support (e.g., marking, supervised course projects, helped with lectures) for the following classes: Machine Learning×2, Reinforcement Learning, Computer Vision×2, Advanced Algorithms×2, Big Data.

2018 – 2018 — **Research Assistant @ Baylor University** - Assisted in research on relativistic properties of temperature, heat conduction, thermal diffusivity.

2017 – 2018 — **Mechanical Engineer in Training (EiT) @ Morrison Hershfield** - Analysis and design of mechanical systems: controls, electrical, HVAC, hydro, fire protection.

2015 – 2016 — **Structural Assistant (summer position) @ Morrison Hershfield** - Conducted bridge inspections in office and on site. Half-cell testing, coring, and deformation analysis. Soffit, deck, and abutment mapping.

Education

2020 – Present — **Ph.D. Computer Science, York University** Deep Learning for Video Analysis.
Supervisor: Dr. Kosta G. Derpanis

2018 – 2020 — **M.Sc. Computer Science, Ryerson University** Deep Learning and Computer Vision.
Thesis title: *An Evaluation of Modalities for Action Recognition*.
Supervisors: Dr. Kosta G. Derpanis and Dr. Neil Bruce

2013 – 2017 — **B.A.Sc. Applied Mathematics and Engineering, Queens University**
Capstone title: *Region Tracking in an Image Sequence: Preventing Driver Inattention*.
Awarded Keyser Award for best capstone project in discipline.

Research Publications

Journal Articles

1. Islam, A., Kowal, M., Derpanis, K., & Bruce, N. (2021). SegMix: Co-occurrence Driven Mixup for Semantic Segmentation and Adversarial Robustness. *Springer The International Journal of Computer Vision (under review)*. Retrieved from https://arxiv.org/abs/2108.09929

2. Islam, A., Kowal, M., Jia, S., Derpanis, K., & Bruce, N. (2021b). Position, Padding and Predictions: A Deeper Look at Position Information in CNNs. *Arxiv pre-print*. Retrieved from https://arxiv.org/abs/2101.12322

3. Kowal, M., Sandison, G., Yabuki-Soh, L., & la Bastide, R. (2017). Region Tracking in an Image Sequence: Preventing Driver Inattention. *Arxiv Pre-print*. Retrieved from https://arxiv.org/abs/1908.08914

Conference Proceedings

1. Kowal, M., Siam, M., Islam, A., Bruce, N., Wildes, R., & Derpanis, K. (2022). A Deeper Dive into what Spatiotemporal Models Encode: Static vs. Dynamic Information. In *Conference on Computer Vision and Pattern Recognition (CVPR)*. Retrieved from https://arxiv.org/abs/2206.02846

2. Islam, A., Kowal, M., Esser, P., Jia, S., Ommer, B., Derpanis, K., & Bruce, N. (2021). Shape or Texture: Understanding Discriminative Features in CNNs. In *International Conference on Learning Representations (ICLR)*. Retrieved from https://arxiv.org/abs/2101.11604

3. Islam, A., Kowal, M., Jia, S., Derpanis, K., & Bruce, N. (2021a). Global Pooling, More than Meets the Eye: Position Information is Encoded Channel-Wise in Cnns. In *International Conference on Computer Vision (ICCV)*. Retrieved from https://arxiv.org/abs/2108.07884

4. Islam, A., Kowal, M., Jia, S., Derpanis, K., & Bruce, N. (2021c). Simpler Does It: Generating Semantic Labels with Objectness Guidance. In *British Machine Vision Conference (BMVC)*. Retrieved from https://arxiv.org/abs/2110.10335

5. Islam, A., Kowal, M., Derpanis, K., & Bruce, N. (2020). Feature Binding with Category-Dependant MixUp for Semantic Segmentation and Adversarial Robustness. In *British Machine Vision Conference (Oral)*. Retrieved from https://arxiv.org/abs/2008.05667

6. Keimakh, D., Kowal, M., & Haibe-Kains, B. (2020). An Analysis of Structural Variant Callers. In *Cancer Big Data and AI Conference*.

Skills

Coding	Python, Bash, MATLAB, LaTeX.
Library's	PyTorch, NumPy, TensorFlow, PIL, OpenCV, SciPy.
OS	Linux, MacOS, and Windows.
Communication	Strong ability to communicate or present technical concepts in an engaging manner.
Misc.	Academic research, consulting, teaching, tutoring.
Hobbies.	In order of skill: calisthenics, baseball pitcher (4 years on Queen's varsity team), competitive Super Smash Bros. Melee, close up magic, skateboarding, trail running, meditation, rock climbing, birding, gardening.

Awards and Achievements

2021	**Vector Post-Graduate Affiliate (PGA)**, Vector Institute, Toronto ($12,000). Affiliate status for two year term. Accepted.
	York Graduate Scholarship (YGS), York University, Toronto ($3,000). Entrance scholarship. Accepted.
2020	**Ontario Graduate Scholarship (OGS)**, Ryerson University ($15,000). Accepted.
2017	**Keyser Award**, Queen's University ($1,000) - Best capstone project in Applied Mathematics and Engineering discipline. Accepted.
2013	**Queen's Excellence Scholarship**, Queen's University ($8,000). Accepted.

References

Available on Request