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Nicholas Vinden

PROFILE

Passionate, detail-oriented, aspiring computer science professional with a focussed interest in embodied AI. I am seeking to utilize my knowledge and skills to contribute to the growth and profitability in the fields of embodied AI, and game theory.

SELECTED SKILLS

Deep Learning Skills Used in Research Positions: Language models, instance and semantic segmentation, reinforcement learning.

Research Areas of Interest: Embodied AI, and game theory.

Technical Skills: Python development with ML tools (PyTorch, Tensorflow), diagnostic tools (TensorBoard, WandB), research communication (LaTeX, PowerPoints, etc.).

RELEVANT WORK EXPERIENCE

Undergraduate Researcher / PAIR Labs, Vector Institute, University of Toronto — *Reward Augmented Expectations in Decision Making Problems for Long-Horizon Planning*

MAY 2022 - PRESENT

- Collaborating With PHD Candidate Raeid Saqur and Dr. Animesh Garg, to create an agent to outperform best models on the ALFRED scene navigation task challenge
- Designed and optimized expert semantic segmentation strategies to increase task success rate over baseline from 12% to 19%.
- Continuing research by utilizing pretraining with procedural scene generation. Journal application scheduled for April 2023.

Undergraduate Researcher / University of Guelph — *Siamese Neural Network Architectures for Computing Surname Similarity*

SEPTEMBER 2021 - PRESENT

- Working with PHD Candidate Jeremy Foxcraft and Dr. Luiza Antonie to measure effectiveness of traditional random forest, and siamese neural networks while measuring surname similarity.
- Designed a complete pipeline for training, evaluating, and parameter selection for language models (transformers, and LSTMs).
- The research findings were presented at the International Population of Data Linkage conference in Edinburgh, Scotland in 2022. Application has

been made to present the findings at the Canadian AI conference in Montreal, Canada in June 2023

Undergraduate Researcher / University of Guelph — *Real-Time Instance Segmentation on Bovine Using Low-Spec Devices*

SEPTEMBER 2022 - PRESENT

- Lead engineer responsible for designing a model to create real-time instance masks from images of cows and pigs
- Model to be utilized in agriculture in a pipeline to predict bovine body mass given only images

Undergraduate Researcher / University of Guelph — *USRA: Inquiry into Using Visual Transformers in Sequential Salience*

May 2020 - September 2020

- Awarded CDN$8,500 prize to collaborate with Dr. Neil Bruce to research and refine sequential salience AI algorithms.
- Proposed, implemented, and trained visual transformer architecture to predict human eyeball saccade movement when exploring images.

Teacher's Assistant / University of Guelph Statistics Learning Center

JANUARY 2022 - APRIL 2022

- Tutoring as a member of the Statistics Learning Centre.
- In charge of organizing discussion, responding to questions, and developing an engaging space for learning for students in statistics.
- Practicing effective communication of complex ideas to students with many questions.

Python Coding Instructor / PREP 1000 (External Class Preparation Course)

JANUARY 2022 - MAY 2022

- Created three video lectures and worksheets, introducing the basics of Python coding for an intro-level biology and data science class at the University of Western Ontario.

EDUCATION

University of Guelph — *Major in Computer Science, Minor in Mathematics, Minor in Statistics*

SEPTEMBER 2019 - APRIL 2024

RELEVANT MAJOR PROJECTS

BrainTank Deep Learning (Lecture Series)

- Developed workshop designed to teach beginner programmers the basics of machine learning to the creation of real deep learning solutions.

- Creator and curator of curriculum to accelerate education in a collaborative environment. Thirteen students graduated with certification.
- Was an active peer, assisting to accelerate student's education in machine learning.
- Developed presentation material to effectively communicate numerous complex concepts and tasks.

VindenBot (Current)

- Designing a 4-wheel drive robot with a camera and LIDAR distance sensor, to perform different navigational tasks within a typical house environment.
- The robot is trained with reinforcement learning in a LIDAR scan, and then transferred to the physical robot, bridging the sim2real gap.
- This is being used to learn about challenges in the field of embodied AI research.

Take-5 God Bot

- Created an agent that beats humans at the card game "Take 5".
- Used a counterfactual regret minimization technique to train the agent, building on an interest in techniques to approximate Nash equilibrium in zero-sum games.

TRAINING & CERTIFICATIONS

Game Theory Certification (Current), Coursera, University of Stanford and University of British Coliumbia.

Machine Learning Certification, Coursera, University of Stanford, taught by Andrew Ng.

Deep Learning Specialization, Coursera, Deeplearning.ai, taught by Andrew Ng.

SCHOLARSHIPS & AWARDS:

Undergraduate Student Research Award: CDN $8,500 research prize awarded, used to student sequential salience with Dr. Neil Bruce.

Honors Student (First, Second, Third years): Achieved over 80% grade in every year of undergraduate program.