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Cem ANIL

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EDUCATION

PhD in Compute Science, University of Toronto **09/2019 – Present**
Supervisors: Roger Grosse and Geoffrey Hinton

Bachelor of Applied Science, University of Toronto **09/2014 – 05/2019**
Engineering Science – Robotics (+ professional experience year in NVIDIA)
Academic Standing: cumulative GPA 3.98, graduated with High Honours

RESEARCH EXPERIENCE

Sorting Out Lipschitz Function Approximation with Neural Networks — 06/2018 – Present

University of Toronto, Vector Institute — ML / Neural Net Architecture Design
Supervisor: Prof. Roger Grosse — **ICML 2019**

- Developed a novel neural net architecture that is provably Lipschitz (a constraint on smoothness) while remaining expressive. The Lipschitz constraint is useful for provable adversarial robustness, generalization and Wasserstein distance estimation.
- Introduced the GroupSort nonlinearity, a general purpose, Lipschitz activation function and proved GroupSort networks are universal Lipschitz function approximators.
- Demonstrated empirically that GroupSort networks can obtain tighter estimates of Wasserstein distance, used to train Wasserstein GANs and provide provable adversarial robustness guarantees while achieving strong generalization performance.

TimbreTron: A WaveNet(CycleGAN(CQT))) Pipeline for Musical Timbre Transfer — 02/2017 - Present

University of Toronto, Vector Institute — ML / Algorithmic Creativity
Supervisors: Prof. Roger Grosse, Prof. Sageev Oore — **ICLR 2019**

- Worked on building a neural network based pipeline that can perform musical timbre transfer.
- Used contemporary conditional audio generation (WaveNet) and generative adversarial training (CycleGAN) methodologies to achieve compelling timbre transfer.
- Demonstrated Constant Q transform as a powerful representation of music data for machine learning applications.

Segmenting Metastatic Brain Tumours using Deep Learning — 05/2016 – 09/2016

University of Toronto, Sunnybrook Research Institute — ML / Medical Imaging
Supervisors: Prof. Anne Martel

- Built a deep learning based medical imaging pipeline targeted at detecting and segmenting brain tumors in 3D MR images.
- Formed a strong foundation in artificial neural networks and how to implement them.

Effect of Motor Preparation on Auditory Evoked Cortical Potentials — 05/2015 – 09/2015

University of Toronto, Rotman Research Institute — Auditory Cognitive Neuroscience
Supervisors: Prof. Bernhard Ross

- Researched the effect of motor preparation in sound making on brain responses, using magneto-encephalogram (MEG) imaging.
- Gained experience in experimental design and analyzing time series data using Short Time Fourier Transform, PCA and ICA.

WORK EXPERIENCE

Deep Learning Engineer / Product Researcher — 05/2017 – 05/2018

NVIDIA Corporation — ML / Computer Graphics
Manager: Mr. Gavriel State

- Spent a year in NVIDIA as part of my Professional Experience Year (an internship program offered by the University of Toronto).
- Reproduced recent techniques from deep learning and generative modelling to build character animation systems for visual arts and computer games.
- Built a reinforcement learning pipeline and environment for the purpose of training agents to perform human-like locomotion.
- Designed a semi-supervised method to error-correct time series predictions, which lead to a patent application.
- Contributed to a project on using randomized synthetic data to train object detection and segmentation systems that operate on complex, real world problems.
- Worked on two demonstrations showcasing our work, which were presented in the SIGGRAPH and ICLR conferences.

PUBLICATIONS

Sorting Out Lipschitz Function Approximation
Cem Anil*, James Lucas*, Roger Grosse (*equal contribution) — ICML 2019
URL: ***https://arxiv.org/abs/1811.05381*** — Conference paper

TimbreTron: A WaveNet(CycleGAN(CQT))) Pipeline for Musical Timbre Transfer
Sicong Huang, Qiyang Li, Cem Anil, Xuchan Bao, Sageev Oore, Roger Grosse — ICLR 2019
URL: ***https://arxiv.org/abs/1811.0962*** — Conference paper

Training Deep Networks with Synthetic Data: Bridging the Reality Gap by Domain Randomization
Jonathan Tremblay*, Aayush Prakash*, David Acuna*, Mark Brophy*, Varum Jampani, Cem Anil, Thang To, Eric Cameracci, Shaad Boochoon, Stan Birchfield (*equal contribution) — CVPR 2018 Autonomous Driving Workshop
URL: ***https://arxiv.org/abs/1804.06516***

PATENTS

Refining Labeling Of Time-Associated Data (non-provisional, pending) — **Filed 10/2018**
Cem Anil, Gavriel State — NVIDP1191/17-TR-0219-US02 (US)

A method to Train a Computer Vision System from Non-Realistic Synthetic Data (provisional, pending) — **Filed 11/2017**
Jonathan Tremblay, Aayush Prakash, David Acuna, Mark Brophy, Varun Jampani, Cem Anil, Thang To, Eric Cameracci, Shaad Boochoon, Stan Birchfield — 17-BL-0293-US02 (US)

CLUB INVOLVEMENT AND ENGINEERING PROJECTS

University of Toronto Data Science Group (Technical Lead) — **05/2016 – 05/2018**
- Took part in executive decision making and proposed one of the long-term visions of the group, which is establishing close collaborations with other engineering clubs in University of Toronto which might benefit from machine learning expertise.
- Led a machine learning / computer vision project related to building an object detection system for drones, in collaboration with University of Toronto Aerospace Team.

EngSci 2nd Year Robotics Competition (1st Place Team) — **01/2016 – 04/2016**
- Designed, built and tested a fully functional autonomous robot in a team of 3 for the engineering science robotics competition.

HONORS AND AWARDS

W.S. Wilson Medal - highest 4th year average in Engineering Science	**2019**
Award - NSERC Undergraduate Summer Research Award (USRA)	**2016**
Studentship - UofT Medical Biophysics Summer Research Studentship	**2016**
Winner Team - Microsoft Coding Competition (UofT)	**2016**
Award - NSERC ACN Create Undergraduate Research Award	**2015**
Award - Undergraduate Engineering Research Day Conference(UnERD) Poster Category – Honorable Mention	**2015**
Valedictorian - High School - 100% Academic Merit Scholarship	**2014**
Qualified - Selected to join the International Physics Olympiads Preparation Camp (top ~30 students in Turkey)	**2014**

TECHNICAL SKILLS

Programming: Python (Numpy, Tensorflow, PyTorch), C++, Matlab, (familiarity with R, Verilog, Arm Assembly, PIC Assembly)

EXTRACURRICULAR SKILLS

Music: Proficient piano player and composer.
- Composed the original scores for two motion pictures: Siyah-Beyaz (2010) and The Smell of the Money (2018).
- Composed the original scores for the short film The Teacup (2016), which won the Best Music and Sound Design Award in the 2016 Dingle International Film Festival in the student category.

Tennis and Scuba Diving: Former licensed tennis player and scuba diver.