Ilia Smirnov

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Ilia Smirnov

Software Developer and Sometime-Mathematician

About Me I am a recent PhD graduate in Mathematics, currently looking for a job in software development, with a special interest in positions in applied Machine Learning.

Selected programming projects

Sep. 2020. Learned Image Classifiers

Implemented k-Nearest-Neighbours, Logistic regression, and Feedforward and Convolutional Artificial Neural Networks in CUDA C++. Applied to an image classification problem (classifying distorted versions of sixteen prototype shapes), where the best CNN achieved 99.3 percent accuracy.   (Essay, GitHub)

Jul. 2020. Tic-Tac-Toe agents using Q-learning

Implemented Tabular Q-learning and DQN reinforcement learning agents, as well as a Minimax agent and another agent based on heuristic rules, all in C++. Able to get all of the agents play optimally (never lose).   (Essay, GitHub)

I also have good knowledge of the standard deep learning libraries. In particular, I worked on implementing and benchmarking modern deep learning models such as ResNets and Transformers in PyTorch.   (Essay, GitHub)

Please see `http://iliasmirnov.com` for essays that describe these projects in greater detail (with interactive frontends that show the project in action) and my GitHub (username `iliathesmirnov`) for the complete programs.

Knowledge of languages, APIs, and frameworks

Strong knowledge

C/C++	STL, boost, CUDA, thrust, cuBLAS, cuDNN
Python 3	PyTorch, NumPy, TensorFlow and Keras, SciKit-Learn, Pandas

Intermediate knowledge

R	
Javascript	AJAX, jQuery, Node.js
TeX/LaTeX	TikZ (graphics in TeX)
HTML, CSS	
Macaulay2	

My current specializations are C/C++ (with CUDA) and Python. I am very open to and interested in expanding my range of knowledge and programming ability.

Professional Interests

Machine Learning, Optimization, Physics Simulation, Computer Algebra

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Education

2012 – 2019, Queen's University
Ph.D. in Mathematics (Algebraic Geometry)

2010 – 2012, Queen's University
M.Sc. in Mathematics (Algebraic Geometry)

2005 – 2010, University of Toronto
B.Sc. in Mathematics and Physics

Job history

2016 – 2018, *Instructor in Mathematics*, Queen's University
Taught courses in Single-variable Calculus, Multi-variable Calculus, and Ordinary Differential Equations (each for a semester, two in-person and two online). For in-person classes, developed complete course materials, including lectures, homework, and examinations, all of which may be accessed at my webpage. Responsible for all aspects of the administration of the courses, including replying to student queries, scheduling examinations, and aiding a Teaching Assistant in preparation for their sessions. Class sizes ranged from 80 to 180 students.

2010 – 2019, *Teaching Assistant*, Queen's University
Assisted with running recitation sessions, grading, and proctoring exams for a range of courses in Mathematics, including graduate courses in Algebraic Geometry and Galois Theory, and an undergraduate course in Group Theory.

Communication skills

Mar. 2017, Research Talk
Workshop on Algebraic Varieties, Hodge Theory and Motives, Fields Institute, Toronto, Canada (Ph.D. research).

Jun. 2015, Poster
GAeL XXIII, Katholieke Universiteit Leuven, Leuven, Belgium (Ph.D. research).

Nov. 2012, Research Talk
Workshop on Algebraic Varieties, Fields Institute, Toronto, Canada (M.Sc. research).

Nov. 2012, Research Talk
Algebraic Geometry Seminar, Queen's University, Kingston, Canada (M.Sc. research).

One of the main organizers for multiple learning seminars on various topics in Mathematics at Queen's University. Gave multiple talks in the Queen's Graduate Student Seminar.

Awards

2013, 2014, 2015 Ontario Graduate Scholarship
2012 E.G. Bauman Fellowship (Queen's University)