




Sergei VOLODIN (aka Sergia)

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Birth date: 3rd of October 1994 (26 years), Russian 

EDUCATION

EPFL Swiss Federal Institute of Technology in Lausanne (EPFL)

Lausanne, Switzerland

Sep 2017 – Apr 2021

- Master's degree in **Computer Science**, GPA: **5.67/6**
- Minor in Computational **Neurosciences**
- Research Assistant position (2017–2019)
- Thesis  "CauseOccam: Learning Interpretable Abstract Representations in Reinforcement Learning Environments via Model Sparsity"

MIPT Moscow Institute of Physics and Technology

Moscow, Russia

June 2017

Bachelor's degree in **Applied Mathematics**, GPA: **4.84/5**

SKILLS

Relevant courses: **Machine Learning, Software Engineering**, Unsupervised and Reinforcement Learning, Convex Optimization, Distributed Algorithms, Algorithms, Random graph theory, Functional Programming, Set Theory, Random Processes, Functional Analysis, Biological modeling of neural networks, Complexity theory, Learning theory, Neuroscience: behavior and cognition, Neuroprosthetics, Theory and methods for Reinforcement Learning, Optimization for Machine Learning, Computer Vision

Scientific programming: **Keras, TensorFlow**, ray/tune/rllib, tf-agents, scikit-learn, PyTorch, Brian 2, MATLAB, Mathematica, R




Programming languages: Python, C/C++, Java, Scala, nasm, C#, AVR C++

Frameworks: Qt/QML, Django, Android Studio, OpenGL/GLSL, Unity 3D, Blender

Environment: Git, \LaTeX , Bash, Debian/Ubuntu Linux

Scientific skills: **experimental** sections of research papers, working on **theoretical** problems, scientific presentation, data analysis


Software development: **agile** software development (Scrum), debugging, design patterns, concurrent and distributed systems, TCP/IP networking, AVR microcontrollers, Arduino platform, team and project management in small startups

Languages:  English: TOEFL iBT **113/120**,  French: A1,  Russian: native


RESEARCH EXPERIENCE

Center for Human-Compatible AI (CHAI), Berkeley

Summer Intern

Berkeley, CA, United States (remote due to COVID-19, from Zurich, Switzerland )

June 2020 – Sep 2020



- Designed  better defenses against adversarial policies in Multi-Agent Reinforcement Learning via alternating training of opponents
- Ran hyperparameter sweeps on multiple machines with ray and rllib
- Converted legacy code using stable baselines and Tensorflow 1.0 to rllib and Tensorflow 2.0
- Publication expected soon at the BAIR blog

Google Research

Mountain View, CA, United States

Software Engineering Intern

Nov 2019 – Feb 2020


- Designed  an algorithm to uncover the **Causal Model** of a **Reinforcement Learning** environment using interventions
- Used TensorFlow and tf-agents to conduct the experiments with large hyperparameter sweeps
- Results  published as an ICLR CLDM workshop paper

EPFL, Distributed Computing Laboratory

Lausanne, Switzerland

Research Assistant

Sep 2018 – Oct 2019



- Investigated **fault tolerance** of a neural network using **Taylor approximation**
- Introduced the *continuous limit* to bound the error, and compared to the Neural Tangent Kernel limit case
- Conducted  experiments to test the theory using Keras including the **implementation** of custom layers and regularizers

EPFL, Computer-Human Interaction in Learning and Instruction laboratory

Lausanne, Switzerland

Research Assistant

Sep 2017 – Aug 2018

- Created  a **library** QML-AR for seamless **augmented reality** using OpenCV with competitive performance on Android and small visual negative impact
- Designed an  activity for kids for learning math using AR, tested the application in a classroom setting, analyzed the obtained data

Skolkovo Institute of Science and Technology,

Center for Energy Systems 

Moscow, Russia

Research Intern

Sep 2016 – Jul 2017



- Characterized using **numerical optimization** and **theoretically** the structure of the set of boundary non-convexities of an image of a quadratic map in case the number of non-convexities is infinite

- Designed and implemented  the Convexity Analysis of Quadratic Maps **library** which gives approximate solutions to a number of problems involving quadratic maps







RESEARCH INTERESTS

Artificial Intelligence, Machine Learning, Artificial Intelligence Safety, Causal Reasoning, Adversarial policies, Mathematical Optimization, Robotics











SCHOLARSHIPS

-  Research Scholars, a paid **Research Assistant** position, Swiss Federal Institute of Technology in Lausanne (EPFL), 2017 – 2019
-  Abramov Fund's scholarship for excellent **grades**, 2014













PUBLICATIONS

-  **ICLR Sergei Volodin**, Nevan Wichers, Jeremy Nixon.  Resolving Spurious Correlations in Causal Models of Environments via Interventions, 2020. Topic choice, experiments, theory, writing.  ICLR CLDM workshop 2020.
- El-M. El-Mhamdi, R. Guerraoui, A. Kucharavy, **S. Volodin**.  The Probabilistic Fault Tolerance of Neural Networks in the Continuous Limit, 2019. Experiments, theory, writing.
- A. Dymarsky, E. Gryazina, B. Polyak, **S. Volodin**.  Geometry of quadratic maps via convex relaxation, 2018. Exp-s, theory, writing.
- A. Petrov, **S. Volodin**  Janibekov's effect and the laws of mechanics. Doklady Akademii Nauk, 2013. Graphics for the article, experiments, **first year** of my BSc














WORK EXPERIENCE

-  **Tournesol**  May 2020 – present
Startup designing better recommender systems, Lausanne, Switzerland 
 - **Co-founded a startup** working on expert-driven recommender systems
 - **Responsible** for  back-end Machine Learning engineering, the API server
 - **Responsible** as well for system administration, (partially) front-end development
-  **EscapeControl**  Jul 2015 – Feb 2016
Own b2b startup for escape rooms, Moscow, Russia 
 - **Created a startup** selling software and hardware for  real-world escape room games which allows to speed up the construction and reduce maintenance costs
 - **Responsible** for back-end software engineering, servers administration, sales and customer support
 - **Managed** a team of two web developers until a successful launch of the web interface
 - Sold more than forty solutions which are currently running in different countries across the globe and provided remote support
- ITBrat**  Jul 2015 – Feb 2016
Algorithmic trading startup, Moscow, Russia 
 - **Developed** algorithmic trading application from initial discussion with the team to deployment and supporting
 - Added low-level user-space networking to the project which allowed to decrease latency and increase profit
 - **Responsible** for the performance of the code






PROJECTS

- Learning Interpretable Abstract Representations in Reinforcement Learning via Model Sparsity** 2020
EPFL semester/thesis project, advised by Dr. Johanni Brea and Prof. Wulfram Gerstner 
 -  Designed an algorithm to learn **Abstract Representations** for **Causal Models of Reinforcement Learning** environments via **Model Sparsity Constraint**
 -  Implemented the proposed algorithm in Tensorflow/pytorch and tested it on a proof-of-concept setting
 -  Presented the project at the MLSS 2020 summer school (remote due to COVID-19)
 -  Extended the framework to non-linear environments and grid worlds
- Safe Proximal Policy Optimization** 2019
EPFL EE-618 course project, advised by Dr. Kamalaruban Parameswaran and Prof. Volkan Cevher 
 -  Added a projection step to the **Proximal Policy Optimization** algorithm to comply with requirements of **Constrained Markov Decision Processes**
 -  Implemented code in Tensorflow and tested it in simple environments
 - Presented the project at the RLSS 2019 summer school (Lille, France)
- Quadcopter drone from scratch project**  2012 – 2014
 - Developed  an algorithm in C++ for stabilization of a quadcopter drone from scratch using AVR microcontrollers, IMU sensors and PID regulators
 - **Managed** the project consisting of 2-5 developers
 - Conducted the analysis of launches to improve  flying quality
 - Results were **published** as a  popular science article (*in Russian*)

CONFERENCES AND SUMMER SCHOOLS

-   Machine Learning Summer School, 2020 (virtual due to COVID-19), **poster presenter**
-   Reinforcement Learning Summer School, 2019 (Lille, France), **poster presenter**, *selected to receive financial help*
-   Data science summer school, 2019 (Paris, France), **poster presenter**
-   QtDay 2019 (Firenze, Italy), **speaker**, *one hour session on qml-ar*
-   P.A.I.S.S. AI Summer School, INRIA Grenoble, 2018, *participant in tutorials given by top experts*;  *selected to receive financial aid*
-   Information Technologies and Systems (Saint-Petersburg, Repino, 2016), **speaker**, *poster presenter*











COMPETITIONS

-   Google HashCode Qualification round coding contest, **top 6%** (team EPFL_Noobs), managed the team, developed algorithms and did the coding, 2019
-   DeepHack.RL hackathon on Deep **Reinforcement** Learning for Atari games, managed the team and developed an  evolutionary algorithm with an autoencoder, MIPT, Moscow, Russia, 2017

INTERESTS

Effective Altruism, Philosophy, Running (1/2 marathon 2018), Snowboarding, Swimming, Dancing Rock'n'Roll

VOLUNTEERING

- Effective Altruism Lausanne** 2019
Local  EA community Lausanne, Switzerland 
Co-founding the group,  introduction workshop speaker, running a  discussion group on AI safety and theory, newsletter management and writing, Facebook events announcements, managing open discussions
- Artificial Intelligence Governance Forum** 2019, 2020
 *AI governance conference* Geneva, Switzerland (2019), virtual due to COVID-19 (2020) 
Time-keeping, technical support, small tutorial on neural networks
- Applied Machine Learning Days** 2019
Machine learning  conference Lausanne, Switzerland 
Technical help for presenters, badge check
- Anti-corruption foundation (A. Navalny)** 2017
A  non-profit aimed at investigating corruption Moscow, Russia 
Conveyed the results of the investigations by talking to people on the streets as a volunteer