




Sergia VOLODIN (Sergei)

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Birth date: 3rd of October 1994 (27 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"

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, L^AT_EX, 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

EPFL, Laboratory for Computational Neuroscience


Lausanne, Switzerland

Master's Thesis student

Oct 2020 – Apr 2021



- Designed  an algorithm with **Python 3**, **Pytorch** and **ray** based on the "Consciousness Prior" proposal that finds a simple causal model of an RL environment in the general case. The project is a continuation of my Google Research internship (see below)
- The algorithm works on benchmarks, see my thesis  "CauseOccam: Learning Interpretable Abstract Representations in Reinforcement Learning Environments via Model Sparsity"
- The work includes theoretical results on abstraction learning as well as a code base with tests and documentation
- The thesis defended on the 21st of April 2021 with Adam Gleave (Berkeley/DeepMind) as an external expert

Center for Human-Compatible AI (CHAI), Berkeley

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

Summer Intern

June 2020 – Sep 2020


- Designed  better defenses against adversarial policies in Multi-Agent Reinforcement Learning via alternating training of opponents using **Python 3**, **Tensorflow**, **ray**, **rllib**.
- 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
- Results published as a blog post  "Defending against Adversarial Policies in Reinforcement Learning with Alternating Training" on the Effective Altruism forum

Google Research

Mountain View, CA, United States

Software Engineering Intern

Nov 2019 – Feb 2020



- Designed an algorithm to uncover a linear **Causal Model** of a **Reinforcement Learning** environment using interventions with **Python 3**, **Tensorflow**, **tf-agents**, and analyzed the effect of interventions on the quality of exploration
- 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**, **Qt/C++** and **Qt/QML** 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** using **MATLAB** which gives approximate solutions to a number of problems involving quadratic maps

PUBLICATIONS

Lê-Nguyên Hoang, Louis Faucon, Aidan Jungo, **Sergei Volodin**, Dalia Papuc, Orfeas Liossatos, Ben Crulis, Mariame Tighanimine, Isabela Constantin, Anastasiia Kucherenko, Alexandre Maurer, Felix Grimberg, Vlad Nitu, Chris Vossen, Sébastien Rouault, El-Mahdi El-Mhamdi.  Tournesol: A quest for a large, secure and trustworthy database of reliable human judgments, 2021. Code for the platform (backend, ML, frontend), experiments, part of data analysis, writing

 **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

 **Fave For Fans**

Sep 2021 – May 2022


Platform dedicated to *passionate fans*, Zürich, Switzerland 



Software Engineer

- First full-time coder. **Responsible** for the backend development with microservices (Cloudflare Workers) with TypeScript, data validation, and CI/CD. The backend uses TypeScript, and an OpenAPI specification, serverless workers and a distributed database.
- **Research** into ways of obtaining data from third-party services with privacy guarantees
- **Conducted** analysis of the database to create better ranking algorithms

 **Tournesol** 


May 2020 – May 2021


Startup designing better recommender systems, Lausanne, Switzerland 

- **Co-founded a startup** working on expert-driven recommender systems
- **Responsible** for  back-end engineering using **Django**, and Machine Learning engineering with **TensorFlow**, the API server
- **Responsible** as well for system administration (Debian), (partially) front-end development with **React.js**
- **Co-authored**  the paper with our results

 **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 (**C++/Python**), 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 in **C++**
- Added low-level user-space networking to the project which allowed to decrease latency and increase profit
- **Responsible** for the performance of the code

RESEARCH INTERESTS

Artificial Intelligence, Machine Learning, Artificial Intelligence Safety/Ethics, Causal Reasoning, Adversarial policies, Mathematical Optimization, Robotics, Consciousness research

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

PROJECTS

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