Ilya Prokin

Russian national with French work permit.

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EXPERTISE Machine Learning, Statistics, Computer Science, Probability Theory, Computational Neuroscience

EDUCATION

Ph.D. Computational Neuroscience, INRIA Rhône-Alpes 2013 Oct.-2016 Dec., Villeurbanne, France
M.Sc. Physics, University of Nizhny Novgorod 2011-2013, Nizhny Novgorod, Russia
B.Sc. Physics, University of Nizhny Novgorod 2007-2011, Nizhny Novgorod, Russia

- Courses included: Computational Methods, Dynamical Systems, Probability Theory, Calculus, and Linear Algebra.

EXPERIENCE

CTO and co-founder, Sysmo 2019 Apr.-present, Puteaux, France

- Sysmo leverages Machine Learning to predict stock-market volatility
- By converting multiple types of Data (such as Internet Chatter, Technical Data, Contextual Data) into intensity indicators of the upcoming reaction of the market, we can anticipate price volatility on specific stocks and produce trading signals that can generate significant Alpha.
- Awards: 1st prize Generation Machine Learning 2018 (HSBC, Société Générale, Sia Partners)
- Acceleration: Le Swave
- Funding: Looking for seed investment

Senoir Data Scientist, Dataswati 2018 Jan.-2019 May, Massy, France

- Predictive models for unevenly sampled time-series with uncertainty quantification (Python).
- Built an automated data pipeline: from raw data to automated cross-validation based feature selection to predictions.
- Applied several Deep Learning approaches: CNN, LSTM, auto-encoders, transfer learning (keras, pytorch).
- Set up collaborations with academic researchers at INRIA.

Independent Researcher, Self-Employed 2017 Jan.-2017 Dec., Paris, France

- Researched synaptic plasticity exposed to randomized input patterns using Monte-Carlo numerical simulations. Collaboration with researchers at Collège de France and INRIA.

Ph.D. Research, INRIA Rhône-Alpes 2013 Oct.-2016 Dec., Villeurbanne, France

- Developed a Data-Driven Mathematical Model which explained the dependence of synaptic learning on the activity of neurons and experimental conditions. See https://github.com/iprokin/Cx-Str-STDP.
- Worked with various experimental and synthetic datasets: Data Cleaning, Parsing, Transformation and Modeling.
- Numerical Stochastic Simulations of Differential Equations, Parameter Optimization, Sensitivity Analysis.
- Python for Data Analysis (NumPy, SciPy, PANDAS, sklearn, and matplotlib) and Numerical Optimization (PyGMO); Numerical Integration in FORTRAN95 interfaced with Python using f2py (x100 faster than Python+SciPy+NumPy).
- 2 scientific publications (one in *eLife*, top 10% journal in biology/neuroscience), 2 submitted.

Research Internship, RIKEN Brain Science Institute 2013 July-Aug., Saitama, Japan

- 3-D reconstruction of neuronal spines from a stack of two-photon microscopy images in MATLAB.

Graduate Research, Institute of Applied Physics 2011-2013, Nizhny Novgorod, Russia

- Processing 64-dimensional time-series data recorded from neuronal cultures grown on multi-electrode arrays.
- Developed a method for graph reconstruction from the time-series data generated by graph's nodes.
- Time-series correlation and its statistical significance in C++; data manipulation/visualization in MATLAB.

Undergraduate Research, University of Nizhny Novgorod 2009-2013, Nizhny Novgorod, Russia

- Solved numerically Differential Equations based model of a Neural Network with a customized Runge-Kutta in C++.
- 2 international scientific publications describing the model of interacting neurons and an adaptive synapse.

INDEPENDENT PROJECTS (see github)

- Halite II AI Programming Challenge (top 3%).
- Machine Learning powered RSS reader, using Naive Bayes, Python, web-UI.
- Bitcoin price prediction & betting bot; including uncertainty quantification (Python/sklearn/scipy/selenium).
- Py_XPPCALL: Python interface to XPPAUT.
- PokerC, Poker Odds Calculator, Haskell.
- Haskell parser of Kospi market data from UDP packets in pcap file.

SKILLS

- OS: GNU/Linux and OS X (4 years), FreeBSD (3 months), and Windows (14 years).
- Technologies: Python (including SciPy, NumPy, PANDAS, and sklearn) (>40000 SLOC[1]), Fortran 90/95 (>3000 SLOC), bash(>2500 SLOC), C/C++ (>15000 SLOC), MATLAB/Octave (>25000 SLOC), Haskell (>5000 SLOC), HTML, CSS, LaTeX, SQL; familiar with InfluxQL.
- Languages: Russian (native), English (fluent), French (working proficiency).

AWARDS

- INRIA PhD Fellowship, INRIA, Oct. 2013 - Dec. 2016.
- Best Graduate Research, University of Nizhny Novgorod, Apr. 2013.
- The Dynasty Foundation scholarship, Jan.-June 2013. One of 40 winners out of 149 applicants.
- Research Achievements scholarship, University of Nizhny Novgorod, Jan.-Dec. 2012. 12 out of about 250 students.
- Best Talk award, 16th Radiophysics Conference, University of Nizhny Novgorod, 15 May 2012. 1 out of 14.

PUBLICATIONS

- Lazarevich, Ivan, Ilya **Prokin**, and Boris Gutkin. "Neural Activity Classification with Machine Learning Models Trained on Interspike Interval Series Data." ArXiv Preprint ArXiv:1810.03855, 2018
- Xu, Hao, Sylvie Perez, Amandine Cornil, Bérangère Detraux, Ilya **Prokin**, Yihui Cui, et al. "Dopamine–Endocannabinoid Interactions Mediate Spike-Timing-Dependent Potentiation in the Striatum." Nature Communications, 2018
- **Prokin**, Ilya, Yihui Cui (*shared first co-authorship*), Alexandre Mendes, Hugues Berry, and Laurent Venance, "Robustness of STDP to spike-timing jitter.", *Scientific Reports*, 2018
- Gangarossa, Giuseppe, Sylvie Perez, Yulia Dembitskaya, Ilya **Prokin**, Hugues Berry, and Laurent Venance, "BDNF controls endocannabinoid-mediated plasticity in striatum.", 2018 (in preparation)
- Cui, Yihui, Ilya **Prokin**, Hao Xu, Bruno Delord, Stéphane Genet, Laurent Venance, and Hugues Berry. "Endocannabinoid Dynamics Gate Spike-Timing Dependent Depression and Potentiation." *ELife* 5, 2016
- **Prokin**, Ilya, Ivan Tyukin, and Victor Kazantsev. "Phase Selective Oscillations in Two Noise Driven Synaptically Coupled Spiking Neurons." *International Journal of Bifurcation and Chaos*, 2015
- **Prokin**, IS, and VB Kazantsev. "Synchronization in the System of Synaptically Coupled Neural Oscillators with Frequency-Dependent Coupling." *Radiophysics and Quantum Electronics*, 2015
- **Prokin**, IS, and VB Kazantsev. "Analysis of Pulsed-Signal Transmission in a System of Interacting Neural Oscillators with Frequency-Dependent Connections." *Radiophysics and Quantum Electronics*, 2012

COMMUNICATIONS

- **Prokin**, I. "Mechanistic Modeling of Spike-Timing Dependent Plasticity of Basal Ganglia Neurons.", 2015 University of Chicago, Chicago, United States of America. (**Talk**).
- **Prokin**, Ilya, Yihui Cui, Silvana Valtcheva, Laurent Venance, and Hugues Berry. "Modeling Spike-Timing Dependent Plasticity of Basal Ganglia Neurons and Its Bidirectional Control by Endocannabinoid Signaling." *Advanced Lecture Course on Computational Systems Biology*. Aussois, France, 2015 (**Poster**)
- **Prokin**, Ilya, Silvana Valtcheva, Laurent Venance, and Hugues Berry. "Mechanistic Modeling of Spike-Timing Dependent Plasticity of Basal Ganglia Neurons." *Neuroscience 2015*. Chicago, United States of America: Society for Neuroscience, 2015 (**Poster**)
- **Prokin**, I. "Detection of Multiple Spike Transmission Pathways in Neuronal Networks Based on Multichannel Recordings." Institute for Theoretical Biology, Humboldt-Universität zu Berlin, Berlin, Germany, 2012 (**Talk**)
- **Prokin**, I. "Introductory Lecture to Lyle Graham Lecture at the Summer School in Computational Neuroscience 'White Nights of Computational Neuroscience: Neurotheory from Cell to Cognition 2012'." Saint-Petersburg State University, Saint-Petersburg, Russian Federation, 2012 (**Talk**)
- **Prokin**, I, and V Kazantsev. "Identifying Functional Connectivity Multigraph in the Time Maps Networks by the Sample of Multidimensional Point Process." *Proceedings of the 16th Scientific Conference on Radiophysics*. Nizhny Novgorod, Russia: University of Nizhny Novgorod, 2012
- **Prokin**, I, A Gladkov, I Mukhina, and V Kazantsev. "Detection of Multiple Spike Transmission Pathways in Neuronal Networks Based on Multichannel Recordings." *8th Int. Meeting on Substrate-Integrated Microelectrodes*, 226–27. Reutlingen, Germany: NMI Natural; Medical Sciences Institute at the University of Tubingen, 2012

ADDITIONAL CLASSES AND SCHOOLS

- Data Science Summer School. École Polytechnique, Palaiseau, France. 25 June - 29 June, 2018
- Data Science Summer School. École Polytechnique, Palaiseau, France. 28 Aug. - 1 Sept., 2017
- Advanced Lecture Course on Computational Systems Biology. INRIA, Aussois, France. 6-11 Apr. 2015
- Summer school in Computational Neuroscience: "White Nights of Computational Neuroscience: Neurotheory from cell to cognition". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 4-15 June 2012
- XVI Scientific school "Nonlinear Waves", Fundamental and applied problems of nonlinear physics. Institute of Applied Physics, Nizhny Novgorod, Russian Federation. 29 Feb.-6 Mar. 2012
- International school "Towards neuromorphic intelligence: experiments, models and technologies". University of Nizhny Novgorod, Nizhny Novgorod, Russian Federation. 3-7 Oct. 2011
- Modular course "Background techniques for Neurophysics: dynamical system theory, statistical physics, wavelet analysis". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 14-17 Sept. 2011
- Modular course "Cellular mechanisms of information transfer: neuronal and synaptic plasticity". Saint-Petersburg State University, Saint-Petersburg, Russian Federation. 7-9 Apr. 2011

REFERENCES

Hugues Berry, Ph.D.
Senior Researcher

Victor Kazantsev, Ph.D.
Vice-Rector for Research and Innovation

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1. SLOC: Source Lines Of Code↩

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