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Zsolt Pajor-Gyulai

Professional summary

Self-directed, quick learner with proven track record of academic research in the area of probability and stochastic processes with a focus on the analysis of small random perturbations of dynamical systems. Ten years of experience communicating and teaching mathematics, with excellent evaluations, to students at various levels of higher education.

Professional experience

2015-present **Courant Instructor/Assistant Professor in Mathematics**, *New York University*.
Studied the long time behavior of diffusions along a heteroclinic networks, which are collections of hyperbolic saddle points and heteroclinic orbits connecting them. Heteroclinic networks are common in different contexts ranging from population dynamics to the modeling of neural processes. Taught various courses in mathematics to undergraduate and graduate students.

2010–2015 **Brin Graduate Fellow**, *University of Maryland, College Park*.
Studied the the macroscopic transport properties of periodic, incompressible, planar cellular flows on intermediate time scales. Established a fractional kinetic effective process whose variance grows as the square root of the elapsed time. This grows turns smoothly into the homogenized linear one for time scales that grow faster than the inverse of the noise intensity. Served as teaching assistant to numerous undergraduate and graduate courses.

Education

2010–2015 **Ph.D. in Mathematics**, *University of Maryland College Park*.
Thesis title: Averaging and homogenization in cellular flows
Advisor: Dr. Leonid Koralov

2004–2010 **B.Sc. and M.Sc. in Physics**, *Budapest University of Technology and Economics*, Diploma with highest honors.
Thesis title: Energy Transfer and Joint Diffusion

Data Science (Continuing education)

Current **Auditing courses:**, *New York University*.
Deep Learning (by Dr. Yann LeCun)
Machine Learning and Computational Statistics (by Dr. David Rosenberg)
Mathematics of Deep Learning (by Dr. Joan Bruna)
with Parallel Curriculum on Reinforcement Learning (by Cinjon Resnick)

Massive Open Online Courses, *Various universites*.
Algorithms and Data Structures Specialization, Coursera, UC San Diego
Machine Learning, Coursera, Stanford University

2017 **Audited courses:**, *New York University*.
Introduction to Data Science (by Dr. Brian d'Alessandro)
CPAC I, Accelerated introduction to computer science with Java (by Dr. Evan Korth)

Programming skills

Python (Numpy, Pandas, PyTorch), Java, Matlab

Projects

Current **Comparison of AI algorithms for TicTacToe**.
Implementing four algorithms in Java to play the simple game TicTacToe: (1) Negamax tree search; (2) Negamax tree search with memoization; (3) Negamax tree search with AlphaBeta pruning; (4) UCT algorithm.

2017 **Population estimation based on satellite imagery**.
Group project to build models predicting population density based on satellite imagery by comparing spatially disaggregated census data on the continental United States to satellite images of the particular region. Approaches used: (1) one versus all logistic regression on the vectorized satellite images; (2) convolutional neural network built from scratch; (3) pre-trained network developed for image recognition.

GitHub: `www.github.com/Moosquibe`

Talks (Selected)

2017 **Fractional kinetic process describing the intermediate time behavior of cellular flows**, *Minisymposium on Random Walks and Anomalous Transport, SIAM Conference on Applications of Dynamical Systems,*, Snowbird, Utah.

2016 **Stochastic approach to anomalous diffusion in incompressible two dimensional cellular flows**, *Hyperbolic Dynamics and Statistical Physics,*, Erwin Schroedinger International Institute for Mathematics and Physics, Vienna.

2015 **On dynamical systems perturbed by a diffusion driven by a null recurrent fast motion**, *1107th AMS Meeting,*, Georgetown University, Washington DC.

Publications (Selected)

2018 Y. Bakhtin, Zs. Pajor-Gyulai *Malliavin calculus approach to long exit times from an unstable equilibrium on the line* Accepted by Annals of Applied Probability

2017 Zs. Pajor-Gyulai, M. Salins *On dynamical systems perturbation by a null-recurrent fast motion: The general case* Stochastic Processes and their Applications

2016 M. Hairer, G. Iyer, L. Koralov, A. Novikov, Zs. Pajor-Gyulai *A fractional kinetic process describing the intermediate time behaviour of cellular flows* Accepted by Annals of Probability

Publications available at:

`https://arxiv.org/find/math/1/au:+Pajor_Gyulai_Z/0/1/0/all/0/1`

Spoken languages

Fluent: Hungarian (native), English

Familiar: German, Spanish