Samuel Wiese

Curriculum Vitae

Wolfson College
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Education

10/2020 - 10/2023* **Computer Science (PhD)**, *University of Oxford*, UK.
- Macroeconomic agent-based modelling: dynamics and forecasting
- Equilibrium convergence in random games
- Supervisors: Prof. J. Doyne Farmer, Dr. Anisoara Calinescu
- Average coursework grade: 81/100

10/2015 - 08/2020 **Mathematics (Diploma)**, *University of Leipzig*, Germany.
Focus on optimization and game theory, top 3%

08/2017 - 04/2018 **Mathematics (Semesters abroad)**, *University of Toronto*, Canada.
Focus on dynamical systems and algebraic geometry, top 3%

10/2015 - 08/2017 **German Law (Intermediate Diploma)**, *Leipzig University*, Germany.
Focus on constitutional law, top 20%

Experience

10/2019 - 01/2020 **Derivatives Trading Intern**, *Allianz Global Investors*, Germany.
- Development of a machine learning model for the automatic execution of exchange-traded derivatives in Python
- Development of a Transaction Cost Analysis (TCA) engine for real-time performance evaluation of traders in derivatives trading
- Sentiment analysis to evaluate market-sensitive Twitter tweets

07/2019 - 10/2019 **Research Intern**, *University of Oxford, Department of Mathematics*, UK.
- Topic: "Best reply structure of multiplayer games"
- Studied convergence frequency of randomly created games for best reply dynamics and six chosen learning dynamics
- Advisor: Prof. J. Doyne Farmer

08/2018 - 09/2018 **Research Intern**, *St. Petersburg State University, Chebyshev Laboratory*, Russia.
- Topic: "Various Shadowing Properties of Dynamical Systems"
- Studied conditions for direct and inverse shadowing using Lyapunov functions
- Advisor: Prof. Sergei Yu. Pilyugin

05/2018 - 08/2018 **Research Intern**, *Cornell University, Department of Mathematics*, US.
- Summer Program for Undergraduate Research
- Studied Laplace eigenvalues and eigenfunctions of fractals using FEM
- Advisor: Prof. Robert S. Strichartz

Skills

Languages German (native), English (fluent), Latin (Latinum)

IT Python (proficient); Sage, Mathematica (intermediate); SQL (novice)

*anticipated

Research

accepted **The Frequency of Convergent Games under Best-Response Dynamics**, with Torsten Heinrich, *Dynamic Games and Applications* (forthcoming).

Generating payoff matrices of normal-form games at random, we calculate the frequency of games with a unique pure strategy Nash equilibrium in the ensemble of n-player, m-strategy games. We then consider a wider class of games that converge under a best-response dynamic, in which each player chooses their optimal pure strategy successively (DOI).

accepted **Spectrum of the Laplacian on Regular Polyhedra**, with Evan Greif, Daniel Kaplan, Robert S. Strichartz, *Communications on Pure and Applied Analysis* 20(1): 193-214, 2021.

We study eigenvalues and eigenfunctions of the Laplacian on the surfaces of four of the regular polyhedrons: tetrahedron, octahedron, icosahedron and cube (DOI).

accepted **A Convex Surface with Fractal Curvature**, with Iancu Dima, Rachel Popp, Robert S. Strichartz, *Fractals* 28(4), 2020.

We construct an example of a convex surface whose curvature is a fractal measure related to the Sierpinski Gasket. The construction produces the surface S as a limit of convex polyhedra P_n. The curvature of each P_n is a discrete measure supported on its vertices, and these discrete measures will converge to the fractal measure on S (DOI).

accepted **Spectrum of the Laplacian on Snowflake Domains and filled-in Julia sets**, with Robert S. Strichartz, *Experimental Mathematics* (forthcoming).

We compute the spectrum of the Laplacian on snowflake domains and chosen filled-in Julia sets, their box-counting dimension and area and investigate the eigenvalue counting function (DOI).

submitted[†] **Best-response dynamics, playing sequences, and convergence to equilibrium in random games**, with Torsten Heinrich, Yoojin Jang, Luca Mungo, Marco Pangallo, Alex Scott, Bassel Tarbush.

We show that the playing sequence–the order in which players update their actions–is a crucial determinant of whether the best-response dynamic converges to a Nash equilibrium. Specifically, we analyze the probability that the best-response dynamic converges to a pure Nash equilibrium in random n-player m-action games under three distinct playing sequences: clockwork sequences (players take turns according to a fixed cyclic order), random sequences, and simultaneous updating by all players. We analytically characterize the convergence properties of the clockwork sequence best-response dynamic (arXiv).

Selected Honors

05/2020 Full Scholarship by the Dept. of Computer Science, Univ. of Oxford

06/2019 Erasmus Scholarship by the German Academic Exchange Service

08/2018 goEast Scholarship by the Germany Academic Exchange Service

07/2018 PROMOS Scholarship by the Germany Academic Exchange Service

05/2018 PIRIP Exchange Program Fellowship at Cornell University

02/2017 University of Toronto Full Tuition Fellowship

12/2016 Full-year Scholarship by the German Academic Exchange Service

10/2016 Scholarship by the Foundation of German Business

[†]second round of review at Games&Economic Behavior