DR GRISHA SZEP

PERSONAL INFORMATION

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SUMMARY

Researcher with 10+ years of experience within biomedical and computational academic research groups and software industry. Expertise in geometric deep learning, differential equations, signal processing and performance optimisation for big data problems. Creative and passionate about building visually stunning tools for solving complex problems.

WORK EXPERIENCE

06/2022 - 05/2024 **Senior Machine Learning Engineer, Cambridge**

Synteny Biotechnology

Third employee at a biotechnology start-up that harnesses the adaptive immune system with deep learning to engineer a new generation of diagnostics, vaccines and therapeutics. Applying generative AI, such as large language and diffusion models, to design 3D protein structures. Building and leading team. Workshop at NeurIPS and 2nd place in IMMREP23 competition.
Chief Research Officer: Neil Dalchau · neil@synteny.ai

09/2017 - 09/2021 **Doctoral Researcher, Cambridge**

Microsoft Research Cambridge

Member of biological programming research team. Thesis on geometric deep learning for point clouds and meshes with focus on high-dimensional single cell datasets. Developed applications in WebGL and D3. Published works in NeurIPS Proceedings, Natural Computing, Nature Comms and JuliaCon.
Supervisor: Neil Dalchau · ndalchau@microsoft.com

11/2019 - 12/2020 **Senior Data Scientist, London**

Flux

Delivering business intelligence and consumer analytics on receipt-level transaction data to merchant partners. Applied time series forecasting models with Scala, Python and PostgreSQL; building tools for A/B testing and actionable reports.
Chief Executive Officer: Matty Cusdon-Ross · matty@tryflux.com

11/2016 - 11/2017 **Research Engineer, Delft**

Birds.ai

Development and maintenance of drone image analysis pipeline for agricultural surveillance and industrial inspection. Applied computer vision techniques for object detection and segmentation on high-resolution satellite imagery. Deployed web applications using AWS.
Chief Executive Officer: Camiel Verschoor · camiel@birds.ai

09/2015 - 11/2016 **Graduate Researcher, Vienna**

Institute of Science and Technology Austria

Investigation of non-equilibrium responses of the cytoskeleton and protein filament vortexes. Used Kinetic Monte-Carlo and ODEs to model polymerisation and applied computer vision and signal processing methods to extract sparse representations from fluorescence microscopy videos. Published works in Cell Press and Nature Physics.
Dr. Med. Michael Sixt · msixt@ist.ac.at Prof. Karsten Kruse · k.kruse@physik.uni-saarland.de

07/2014 - 09/2015 **Research Intern, NASA Ames Silicon Valley**

NASA Ames Research Centre

Applying unsupervised signal processing methods to classify sleep stages on high resolution single channel electroencephalogram (EEG) recordings. Extraction of biomarkers related to neurophysiological disorders and development of human-machine interfaces.
Chief Executive Officer: Dr Philip Low · philip@neurovigil.com

06/2013 - 08/2013 Research Studentship, King's College London

King's College London

Simulation of photon transport in random lasing process. Collection and analysis of data from experiment. Presentation of findings and evaluation as member of research team.
Research Supervisor: Dr Riccardo Sapienza · riccardo.sapienza@kcl.ac.uk

Sep-Dec 2012 Market Stall Owner, Camden Market

Camden Market

Managing market stall in tourist area of north London selling 3D IQ puzzles made of wood and bamboo. Creative presentation and sales to young and old audiences. Financial planning.
Supplier Contact: Ben Meldrum · ben@professorpuzzle.com

EDUCATION

09/2017 - 03/2022 King's College London

Computational Biology & Machine Learning

PhD · Randall Division of Cell & Molecular Biophysics
Published novel geometric deep learning algorithm for the inference of state-space structures in dynamical systems, with applications in developmental and synthetic biology. Writing software in Python and Julia in collaboration with Microsoft Research Cambridge. Published works in NeurIPS Proceedings, Natural Computing, Nature Comms and JuliaCon.
Attila Csikász-Nagy · attila.csikasz-nagy@kcl.ac.uk Neil Dalchau · ndalchau@microsoft.com

09/2011 - 05/2015 King's College London

Physics Masters

First Class · *Physics MSci* · School of Natural & Mathematical Science
Focus on non-equilibrium statistical mechanics, information theory and complex networks. Masters project involved using the Keldysh formalism in quantum mechanics to investigate angular dependence of molecular current-voltage characteristics.
Project Supervisor: Prof. Lev Kantorovich · lev.kantorovich@kcl.ac.uk

08/2013 - 06/2014 University of California, Berkeley

Exchange Year

GPA: 3.7 · *Physics Major* · College of Letters & Science
Attended lectures at the Redwood Center for Theoretical Neuroscience. Expanded knowledge on analytical mechanics, special relativity, solid state physics and machine learning. Duration of stay motivated academic path towards machine learning.
Study Abroad Tutor: Nicola Bonini · nicola.bonini@kcl.ac.uk

COMPUTER SKILLS

Intermediate AWS, GCP, Next.js, C++, C#, PostgreSQL, HLSL, Blender, Unity, NodeJs

Advanced PyTorch, JAX, Julia, WebGL, Flux.jl, Latex, Git, Linux, DevOps, MLOps, D3.js

Datasets Single-cell, 3D Protein Structure, Fluorescence Microscopy, Satellite Imagery

WORKS

Published

Caballero-Mancebo, S. et al. 2024. Nature Physics.
Friction forces determine cytoplasmic reorganization and shape changes of ascidian oocytes upon fertilization

Cornwall, L. & Szep, G. et al. 2023. NeurIPS Generative AI & Biology Workshop.
Fine-tuned protein language models capture T cell receptor stochasticity.

Coppard, V. & Szep, G. et al. 2023. bioRxiv, 2023.12. 21.572741
FlowAtlas.jl : an interactive tool bridging FlowJo and computational tools in Julia.

Szep, G. 2022. Thesis. King's College London
Inferring Bifurcations between Phenotypes.

Szep, G. et al. 2021. Advances in Neural Information Processing Systems
Parameter Inference with Bifurcation Diagrams.

Peruzzo, M., Hassani, F. & Szep, G. et al. 2021. Physical Review X: Quantum Geometric superinductance qubits.

Grant, P. & Szep, G. et al. 2020. Nature Communications 11 (1), 1-8 Interpretation of morphogen gradients by a synthetic bistable circuit.

Dalchau, N. & Szep, G. et al. 2018. Natural computing 17 (4), 761-779 Computing with biological switches and clocks.

Müller, J. & Szep, G. et al. 2016. Cell 171 (1), 188-200. e16 Load-adaptation of lamellipodial actin networks.

Conferences

FlowAtlas.jl : an interactive tool bridging FlowJo and computational tools in Julia. JuliaCon 2021. youtu.be/FeYrFKgP91s

Inference of Bifurcations with Differentiable Continuation. JuliaCon 2020. youtu.be/vp-206RgeVE

2019. Quantitative Systems Biology Workshop. London. Organisation Committee

2019. Bioinspired analysis of dynamical systems, Hungary. Talk

2018. EMBL Symposium: Biological Oscillators, Heidelberg. Poster

AWARDS & QUALIFICATIONS

Awards

2018 · Microsoft Research PhD Scholarship

2014 · Study Abroad Student Award – King's College London

2013 · The Gordon Rogers Scholarship - Top 5 Performing Students

2013 · Andrewes Prize - Best Examination Performance

2012 · Dillon Prize - Best Examination Performance

Qualifications

2016 · Electron Microscope Training - Institute of Science & Technology

2013 · Basic Laser Safety Certificate - King's College London

2012 · Kids Ski Instructor Certificate - Swiss Snowsports

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