Ulf Aslak Lai

Data Scientist, PhD

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Summary

Data scientist and software engineer. Married, proud father of one (so far). Currently the chief data scientist at Rodinia Generation. Nature published researcher, who worked in in Sune Lehmann's group at DTU and SODAS (KU), studying complexity in human behavior. Formerly, external associate professor at DIS Copenhagen teaching courses in Data Science and AI.

Experience

2021 – present **Chief Data Scientist**, Rodinia Generation, Copenhagen, Denmark.
Developing a robust and user-configurable nesting algorithm for waste minimization in the textile industry. Leading development of a modern micro-factory operating system. Technologies: Python, TypeScript, SvelteKit, Django.

2020 – 2021 **Senior Data Scientist**, Danske Bank, Høje-Taastrup, Denmark.
Working on transaction classification between corporate bank customers. Technologies: pyspark, pyspark.ml

2019 – 2020 **Postdoc**, Technical University of Denmark, Kongens Lyngby, Denmark.
Building http://covid19.compute.dtu.dk/ to monitor the state of human mobility throughout the world during COVID-19 lockdowns. Researching the interplay between public information and collective behavior. Technologies: Python, JavaScript, Hugo

2017 – 2020 **External associate professor**, DIS - Study abroad in Scandinavia, Copenhagen, Denmark.
Part time. Developing and teaching undergraduate level courses *Computational Analysis of Big Data* and *Artificial Neural Networks and Deep Learning* for US exchange students. Leading study tours abroad.

2016 – 2019 **Freelance Data Scientist**, Aslak Media, Copenhagen, Denmark.
Occasionally consulting with companies to solve data-related and technical problems. Clients include Alfa Laval, Sterlitech, Popyoular, Peergrade.

2015 **Intern/student assistant**, Trustpilot, Copenhagen, Denmark.
Trustpilot is a platform for reading and sharing customer service reviews. Their customers (businesses) want positive reviews, and some cheat by purchasing fake reviews. As an intern, I developed a probabilistic model for fraud detection that I further maintained and developed as a student assistant.

2013–2016 **Teaching assistant**, Technical University of Denmark.
Courses: Physics 1 (4 times), Computational Tools for Big Data (2 times).

Education

2016–2019 **Ph.D.**, University of Copenhagen, Centre for Social Data Science (SODAS), Denmark.
Research in complex systems, machine learning and visualization. Focus on modeling tasks involving social data such as temporal community detection and location prediction. Developing and teaching machine learning, deep learning and complex network components of master's level course *Topics in Social Data Science*. Advisors: Sune Lehmann, David Dreyer Lassen.

2018 **Visiting researcher**, Robert Koch Institute, Brockmann Lab, Germany.
Worked with theoretical biologist and leading researcher in complex systems Dirk Brockmann.

2014–2016 **M.Sc.Eng.**, Technical University of Denmark, Human Centered AI.
Dissertation: *Personality Archetypes Support Evolutionarily Important Behavioral Strategies*. Advisors: Uri Alon, Sune Lehmann (mark: 12/A)

2016 **Visiting researcher**, Weizmann Institute of Science, Uri Alon Lab, Israel.
Worked with renowned systems biologist, Uri Alon, on the research component of my master's degree.

2010–2014 **B.Sc.Eng.**, Technical University of Denmark, Physics and Nanotechnology.
Dissertation: *Computational Fluid Dynamics Simulations of Forward Osmosis Membrane Modules.* Paper: *Open-source CFD model for optimization of forward osmosis and reverse osmosis membrane modules* (mark: 12/A). Advisors: Claus Helix-Nielsen, Mathias Felix Gruber.

2012 **Visiting student**, National University of Singapore, Physics and Nanotechnology.

2007 – 2009 **Gribskov Gymnasium, Denmark**, *Upper secondary programme*, Mathematics/Physics.

Publications

2020 **The Scales of Human Mobility**, Nature, Co-authors: L Alessandretti, S Lehmann.

Infostop: Scalable stop-location detection in multi-user mobility data, arXiv, Co-author: L Alessandretti.

2019 **Netwulf: Interactive visualization of networks in Python**, Journal of Open Source Software, Co-authors: BF Maier.

Temporally intermittent communities in brain fMRI correlation networks, Applied Network Science, Co-authors: SFV Nielsen, M Mørup, S Lehmann.

2018 **Constrained information flows in temporal networks reveal intermittent communities**, Physical Review E, Co-authors: M Rosvall, S Lehmann.

2017 **Optimal Allocation of Reviewers for Peer Feedback**, European Conference on e-Learning, Co-authors: DK Wind, RM Jørgensen, SL Hansen, O Winther.

2016 **Quantifying Feedback: Insights Into Peer Assessment Data**, International Conference on e-Learning, Co-author: DK Wind.

Open-source CFD model for optimization of forward osmosis and reverse osmosis membrane modules, Separation and Purification Technology, Co-authors: MF Gruber, C Hélix-Nielsen.

Talks and workshops

2020 **Talk**, DTU Compute, Denmark, DTU Corona Talks.
Talk title: *Monitoring Changes in Travel Behavior during the Danish Lockdown.*

2019 **Talk**, National Institute of Public Health, Denmark.
The 2019 Annual Centre for Intervention Research seminar. Talk title: *Copenhagen Network Study: Afterthoughts on a massive social data experiment.*

Workshop, Centre for Digital Anthropology, UCL, London.
Workshop on online toxicity detection data competition. Mixing anthropologists and AI students to workshop on bias in machine learning.

Workshop, University College Absalon, Denmark.
Workshop om dataforstaelse 101. Gave workshop on data science to faculty at the Absalon teaching academy.

2018 **Talk**, Integrated Science Lab, Sweden.
Workshop: Where Network Theory Meets Ecology. Talk title: *Constrained information flows in temporal networks reveal intermittent communities.*

Talk, New England School of Complex Systems, USA.
Conference: International Conference on Complex Systems. Talk title: *Does your temporal network have communities that pop in and out of existence?.*

Talk, NetSci Society, Paris.
Conference: NetSci: International School and Conference on Network Science. Talk title: *Constrained information flows in temporal networks reveal intermittent communities.*

Talk, University of Valencia, Spain.

Image Processing Laboratory. Talk title: *Finding intermittent clusters of flow in temporal networks.*

Workshop, University of Copenhagen, Denmark.

Conference: *NoLesLaw First Annual Conference.* Gave workshop on data visualization.

2017 **Talk**, Barrel AI, Malmö, Sweden.

Title: *Neighborhood flow coupling: method for finding intermittent clusters of flow in multilayer networks.*

Talk, University of Copenhagen, Denmark.

Workshop: *Experimenting with social data.* Talk title: *From JSON-packets to relationships.*

Talk, University of Tartu, Estonia.

Workshop: *Workshop on data processing and analytics of smartphone and GPS data.* Talk title: *Computing high-level indicators of behaviour using smartphone data.*

Talk, University of Central Florida, Orlando, USA.

Conference: *International Conference on e-Learning.* Talk title: *Quantifying Feedback: Insights Into Peer Assessment Data.*

Poster, Danish Acad. of Tech. Sciences, Copenhagen, Denmark.

Presented the *Copenhagen Networks Study* to politicians, academics and industrial leaders at annual symposium.

Talk, NetSci Society, Tel Aviv.

Conference: NetSci-X: International School and Conference on Network Science. Talk title: *Detecting communities in temporal networks.*

2014 **Poster**, Grøn Dyst, Lyngby, Denmark.

Presented my B.Sc. thesis work on fluid dynamics simulations in osmotic filtration modules.

Teaching

2016–2020 **Lecturing**, *20-30 student classes*, Danish Institute of Study Abroad, Copenhagen, Denmark.

Artificial Neural Networks and Deep Learning ($\times 2$)
Computational Analysis of Big Data ($\times 6$)

2016–2020 **Lecturing**, *60-80 student classes*, University of Copenhagen, Copenhagen, Denmark.

Digital Methods: From Facebook Ethnography to Computational Social Science ($\times 1$)
SDS: Text Data and Deep Learning ($\times 1$)
SDS: Machine Learning and Econometrics ($\times 1$)
Social Data Science ($\times 1$)
Topics in Social Data Science ($\times 2$)

2012–2016 **Teaching assistant**, *60-80 student classes*, Technical University of Denmark, Lyngby, Denmark.

Computational Tools for Big Data ($\times 2$)
Physics 1 ($\times 4$)

Influential reading

2021 **Maybe You Should Talk To Someone**, L Gottlieb.

The Dreamers, Karen Blixen.

Working Backwards, B Carr, C Bryar.

The Minimalist Entrepreneur, S Lavingia.

2020 **Meditations**, M Aurelius.

Skin in the Game, NN Taleb.

It Doesn't Have to Be Crazy at Work, J Fried, DH Hansson.

	A Farewell to Arms, E Hemmingway.
2019	**Why We Sleep**, M Walker.
	Body by Science, J Little, D McGuff.
	How to Change Your Mind, M Pollan.
past – 2018	**The Man Who Stole Himself**, G Pálsson.
	A PhD Is Not Enough, PJ Feibelman.
	Brave New World, A Huxley.
	The Stranger, A Camus.
	Vagabonding, R Potts.
	Walden, HD Thoreau.
	Weapons of Math Destruction, C O'Neill.
	The Effective Executive, PF Drucker.
	Ten Arguments For Deleting Your Social Media Accounts Right Now, J Lanier.
	The Obesity Code, J Fung.
	Sapiens, Homo Deus, YN Harari.

Awards and stipends

2018	**1st place**, *Young Initiative for Best Talk Pitch*, NETSCI SOCIETY.
2017	**Best paper**, *International Conference on e-Learning*, UNIVERSITY OF CENTRAL FLORIDA.
2016	**1st place**, *Data Stories data visualization competition*, SCIENCE MAGAZINE.
2014	**Finalist**, *Green Challenge environmental engineering competition*, TECHNICAL UNIVERSITY OF DENMARK.
2013-2017	**Travel stipends**. *The Oticon Foundation*; *Reinholdt W. Jorck and Wife's Foundation*; *The Danish Society of Engineers' Foundation*; *Berg-Nielsens Study and Support Foundation*; *Knud Højgaard's Foundation*; *Danish Tennis Foundation*; *Otto Mønsted's Foundation*; *Danish-Israeli Study Foundation* and the *Augustinus Foundation*.

Skills

Background	I have a background in physics engineering and have strong foundation in applied mathematics, statistical physics, information theory and probability theory. In maturing as a computational scientist I have developed a deep understanding of and ability to apply methods for modeling data. I am passionate about science communication through animation and data visualization, which led me down the path to becoming a self-taught web developer.
How I work	I mainly use **Python** for scientific computing (sometimes **C++**). I prefer to work with simple transparent tools such as **NumPy**, **Pandas** and **SciPy** for data processing and simple modeling, and use tools like **scikit-learn** to perform very high-level modeling tasks. I prefer **PyTorch** for deep learning. I may outsource computations to a **cloud** server and occasionally use tools like **Spark** to work with very big data. For simple data visualization I use **Matplotlib** and for advanced interactive visualizations I use web technologies (**JavaScript**, **D3**). I love building web applications with modern frameworks like **Svelte** and **FastAPI**. I prefer **Git** for version control and **Github** for code hosting. I wrote this document with **LaTeX**. I design my illustrative figures using tools like **Illustrator** and sometimes **Blender**. I work best on a **Unix**-based machine, preferably a Mac.

Volunteer work

2019 – 2020   **Organizer**, DATABEERS, Copenhagen, Denmark.
Co-organizing the Copenhagen chapter of the international event concept DataBeers.

2016 – 2019   **Skateboarding instructor**, RESOURCE CENTRE OUTER NØRREBRO, Copenhagen, Denmark.
Teaching skateboarding to children aged 9 to 17.

Apr 2015   **Member of the Board of Appeals**, TECHNICAL UNIVERSITY OF DENMARK.
Partaking in re-evaluation of exam projects in the course *Technology, economics, management and organization*.

2013–2014   **Pre-exam tutor**, TECHNICAL UNIVERSITY OF DENMARK.
Helping students understand key concepts in *Physics 1*, in the days leading up to their re-examination.

2010-2012   **Rhythmic dance instructor**, AFTENSKOLEN V/ LIS CRONBERG, Hillerød, Denmark.
Teaching rhythmic dance to disabled people of all ages.

2010 – present   **Writer/Editor**, WUNDERBAUM MAGAZINE, Copenhagen, Denmark.
Periodically contributing to the online news stream at the Danish skateboarding magazine *Wunderbaum*, and writing pieces in the annually published paper edition.

2008–2010   **Music booker**, TOLDKAMMERET, Helsingør, Denmark.
Responsible for booking bands and arranging events at independent music venue.

Coursework

2016–2017   **Ph.D**.
Comp. Soc. Sci. and Complex Systems, SCHOOL OF PHYSICS "ENRICO FERMI", Varenna, Italy
Complex systems summer school, SANTA FE INSTITUTE, New Mexico, US
Bayesian Data Analysis, TECHNICAL UNIVERSITY OF DENMARK
IceLab Camp, UMEÅ UNIVERSITY, Umeå, Sweden

2014–2016   **M.Sc.Eng.**, TECHNICAL UNIVERSITY OF DENMARK.
Non-Linear Signal Processing; Graph Theory; Applied Statistics and Statistical Software; Computational Tools for Data Science; Social data analysis and visualization; Personal Data Interaction; Introduction to Machine Learning and Data Mining; Social graphs and interactions; Data mining using Python; Technology, Economics, Management and Organization.

2010–2014   **B.Sc.Eng.**, TECHNICAL UNIVERSITY OF DENMARK.
Electromagnetism for Physicist; Quantum Mechanics; Advanced Mathematics 2; Linear Control Design 1; Advanced Engineering Mathematics; Thermodynamics and Statistical Physics; Philosophy of science in engineering; Introduction to Biophysics; Fabrication of Micro- and Nano Structures; Electric Circuits 2; Optics and Photonics; Experimental Methods and Instrumentation in Physics; Planetary Physics; Visualization of Micro- and Nano Structures; Experimental Micro- and Nanotechnology; General Chemistry; Mechanics and Physical Modelling

Languages

Fluent   **Danish, English**

Intermediate   **German**