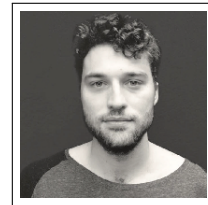# Ulf Aslak

Research/Data Scientist, PhD

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Summary

I am a postdoc at DTU Compute in Sune Lehmann's group working on the HOPE project. Formerly an assistant professor at the Center for Social Data Science and external lecturer at DIS Copenhagen. I have published research on community detection in dynamic face-to-face networks, user behavior in online e-learning platforms, and computational fluid dynamics (early career). I maintain multiple open source Python libraries, notably Infostop and Netwulf. I am currently working on quantifying human mobility patterns during the COVID-19 lockdowns (see our results here).

Experience

2019 – 2020 **Assistant professor**, UNIVERSITY OF COPENHAGEN, Denmark.
Part time. Developing the new master's degree in Social Data Science. Lecturing in *Social Data Science: Econometrics and Machine Learning*, *Social Data Science: Text Data and Deep Learning*, and *Digital Methods: From Facebook Ethnography to Computational Social Science*.

2017 – present **External lecturer**, 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.

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.

2014–2015 **Animation Artist**, STERLITECH CORPORATION, Seattle, US/Remote.
Sterlitech is a company that develops water filtration modules. Following the publication of my bachelor's thesis, where I modeled fluid flow in one of their modules, I produced a series of commercial instructional 3d animation videos for Sterlitech.

2013–2016 **Teaching assistant**, TECHNICAL UNIVERSITY OF DENMARK.
Courses: Physics 1 (4 times), Computational Tools for Big Data (2 times).

2013–2014 **Undergraduate researcher**, AQUAPORIN, Copenhagen, Denmark.
Aquaporin is a high-tech bio-physics company that produces specialized membranes for low-energy osmosis-driven water filtration. During the last year of my bachelor's degree I worked as a UG researcher at Aquaporin, and conducted research for my dissertation.

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.

2017 **Summer school**, Santa Fe Institute, USA.
Participated in the month-long Santa Fe Institute's Complex Systems Summer School.

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.

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

2012 **Exchange student**, National University of Singapore, Physics and Nanotechnology.
Attended courses in Chinese, solid state physics, programming methodology and electrical engineering.

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). Advisor: Claus Helix-Nielsen

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

Research articles

2020 **Infostop: Scalable stop-location detection in multi-user mobility data**, arXiv preprint, Co-author: Laura Alessandretti.

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

Rhythm of relationships in a social fish over the course of a full year in the wild, Co-authors: Christopher T. Monk, Dirk Brockmann, Robert Arlinghaus.

Temporally intermittent communities in brain fMRI correlation networks, Applied Network Science, Co-authors: Søren. F. V. Nielsen, Morten Mørup, Sune Lehmann.

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

2017 **Evolutionary tradeoffs and the geometry of human personality space**, Co-authors: Hila Sheftel, Sune Lehmann, Uri Alon.

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

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

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

Conferences and workshops

2019 **Organizer**, DataBeers, Copenhagen, Denmark.
Co-organizing the Copenhagen chapter of the international event phenomenon DataBeers.

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*.

Attendance, Royal Danish Acad. of Sciences, Denmark.

Conference: Mind and Democracy in the Age of Social Media. Arranged by minister of education and research, Søren Pind.

Talk, University of Valencia, Spain.

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

Organizer, University of Copenhagen, Denmark.

Conference: *NoLesLaw First Annual Conference*. 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.

Attendance, Data Power: Activism/appropriations/aesthetics, London, UK.

Workshop on ethics in data science and machine learning at the Centre for Digital Anthropology, University College London.

Talk, NetSci Society, Tel Aviv.

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

2016 **Attendance**, SIGGRAPH, Anaheim, California, USA.

Participated in workshops on GPU computing, databases, and animation.

2014 **Poster**, Green Challenge, Lyngby, Denmark.

Title: *Module optimization protocol for testing forward osmosis membrane modules*.

Poster, DWRIP, Copenhagen, Denmark.

Title: *Module optimization protocol for testing forward osmosis membrane modules*.

Teaching

2016–2020 **Lecturer**, Danish Institute of Study Abroad, Copenhagen, Denmark.
Artificial Neural Networks and Deep Learning ($\times 2$)
Computational Analysis of Big Data ($\times 6$)

2016–2020 **Lecturer**, 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**, Technical University of Denmark, Lyngby, Denmark.
Computational Tools for Big Data ($\times 2$)
Physics 1 ($\times 4$)

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, and am self-taught in using various creative tools.

How I work I mainly use **Python** for scientific computing. 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 use **PyTorch** for deep learning. For simple data visualization I use **Matplotlib** and for advanced interactive visualizations I use **JavaScript** often with **D3**. I outsource computations to remote servers using **Bash**, and occasionally use tools like **MapReduce** and **Spark** to do computations on big datasets. I use **Github** to share research code and tools I make. I write papers using **LaTeX**. I design my illustrative figures using tools like **Blender 3D** and **Illustrator**. I work best on a **Unix**-based machine.

Volunteer work

2016 – present **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**