

# Alexander Johansen

COPENHAGEN · DENMARK

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## Research Interest

I am curious about the underlying latent structure of language. I investigate language through mathematical constructs, natural language, bioinformatics, and chemistry. My recent work is focused on building neural components that can extrapolate, exploration in program synthesis, and transferring natural language processing methods into bioinformatics and medical technologies.

## Education

### Stanford University

PH.D. COMPUTER SCIENCE

- Fulbright Scholar

Stanford, California, USA

Sep 2020 - est. Jun 2026

### Technical University of Denmark

M.Sc. MATHEMATICAL MODELING AND COMPUTATION, GPA: 11.44/12.00

- Nanyang Technological University, Singapore — Semester Abroad Fall 2015
- Honors program, Supervised by Professor Ole Winther

Kongens Lyngby, Denmark

Sep 2014 - Dec 2016

### Copenhagen Business School

B.Sc. BUSINESS ADMINISTRATION AND INFORMATION SYSTEMS, GPA: 10.70/12.00

- Lincoln University, Canterbury, New Zealand — Semester Abroad Fall 2013

Frederiksberg, Denmark

Sep 2011 - Jun 2014

## Experience

### Ocean.io

HEAD OF DATA SCIENCE RESEARCH

Developing and pushing state-of-the-art NLP projects to production at scale.

Copenhagen, Denmark

Feb 2020 - est. Sep 2020

### Technical University of Denmark

RESEARCH PROJECT MANAGER

Inspired by my time at Salesforce Research, I started a student based research lab with research meetings every Tuesday and one-on-ones every Thursday. More than 30 students (M.Sc. and Ph.D.) have participated in the lab in 2019 resulting in several publications. To find research projects I collaborated with professors and Ph.D. students at the university on hot topics and datasets. The majority of the participants had previously done projects with me in the 02456 Deep Learning course.

Kongens Lyngby, Denmark

Jan 2019 - Jan 2020

### Salesforce

DEEP LEARNING RESEARCH, INTERN

Under the supervision of Richard Socher (Salesforce Research) I researched in probability based decision making (+100k impression blogpost, ACL workshop paper); multi-task learning for NLP; and mixture-of-experts using distributed computing, PyTorch, and TorchText.

172 University Ave, Palo Alto, CA

94301, USA

Jan 2017 - Jan 2018

## Teaching

### Technical University of Denmark

DEEP LEARNING, 02456

In 2018 and 2019 I have been the head TA with significant course material contributions. Half of the course is project based and I supervise the NLP, Bioinformatics, and RL projects; the most popular amongst students for 2018 and 2019.

Head TA

Fall 2016, Fall 2018, Fall 2019

MASTER THESIS SUPERVISION

I co-supervise 16 Master Thesis projects (an M.Sc. thesis is 5 months full-time). The thesis' have investigated formal languages, Levenhstein transformer, multi task learning, exploration in VQA, bio-/, and cheminformatics; resulting in multiple journal submissions.

Co-Supervisor

Spring 2019, Fall 2019, Spring 2020

SPECIAL COURSES

I have supervised 11 special course projects (a special course is 4 months part-time). Similar to M.Sc. thesis, the special courses have investigated topics within deep learning methods and applications.

Co-Supervisor

Spring 2019, Fall 2019

Exercises from Chap 1-13 in Sutton & Barto and Homework 1-2 from UC Berkeley's Deep RL course. 9 Students (M.Sc. and Ph.D.).

Adjusted version of UC Berkeley's Deep RL course, co-supervised with Ass. Prof. T. Herlau. 10 students (M.Sc. and Ph.D.).

## Community

### Deep Learning Copenhagen

MeetUp

FOUNDER

Nov. 2018 - PRESENT

Inspired by Richard Socher's public poster exam in CS224N I convinced Professor Ole Winther to do the same for our 02456 Deep Learning course. With students posters, company sponsored first prize, drinks, and pizza. Given the positive feedback, me and a bioinformatics Ph.D. student started a research lab and kept hosting events for our students. This has resulted in seven events by now, +1.5k participants, and multiple company sponsorships. ([Event page https://www.meetup.com/Deep-Learning-DTU/](https://www.meetup.com/Deep-Learning-DTU/) [student research lab https://alrojo.github.io](https://alrojo.github.io)).

### Open Source

GOOGLE TENSORFLOW

contrib.seq2seq: #4761, #4686, #4382

TensorFlow tutorial (2k stars): <https://github.com/alrojo/tensorflow-tutorial>

## Academic Reviews

2020	<b>ACL</b> , Association for Computational Linguistics	Reviewer
2020	<b>AAAI</b> , Association for the advancement of artificial intelligence	Program committee
2019	<b>CoNLL</b> , Computational Natural Language Learning	Reviewer
2018	<b>CoNLL</b> , Computational Natural Language Learning	Reviewer
2017	<b>NIPS</b> , Neural Information Processing Systems	Assisted review
2017	<b>ICML</b> , International Conference on Machine Learning	Assisted review

## Journal Publications

### An introduction to deep learning on biological sequence data: examples and solutions

PUBLISHED

BIOINFORMATICS (IF: 4.5) VOLUME 33, ISSUE 22, PAGES 3685-3690, OXFORD UNIVERSITY PRESS

[HTTPS://ACADEMIC.OUP.COM/BIOINFORMATICS/ARTICLE/33/22/3685/4092933](https://academic.oup.com/bioinformatics/article/33/22/3685/4092933)

2017

V. Jurtz, [A. Johansen](#), M. Nielsen, J. Armenteros, H. Nielsen, C. Sønderby, O. Winther and S. Sønderby

## Conference Publications

### Short term blood glucose prediction based on continuous glucose monitoring data

POSTER

IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY (EMBC)

2020

[HTTPS://ARXIV.ORG/ABS/2002.02805](https://arxiv.org/abs/2002.02805)A. Mohebbi, [A. Johansen](#), N. Hansen, P. Christensen, M. Jensen, J. Tarp, H. Bengtsson, M. Mørup

### Neural arithmetic units

SPOTLIGHT (top 6%)

INTERNATIONAL CONFERENCE ON LEARNING REPRESENTATIONS

2020

[HTTPS://OPENREVIEW.NET/FORUM?ID=H1gN0eHKPS](https://openreview.net/forum?id=H1gN0eHKPS)A. Madsen, [A. Johansen](#)

### Deep recurrent conditional random field for protein secondary structure prediction

ORAL

ACM CONFERENCE ON BIOINFORMATICS, COMPUTATIONAL BIOLOGY, AND HEALTH INFORMATICS

2017

[HTTPS://DELIVERY.ACM.ORG/10.1145/3110000/3107489/p73-JOHANSEN.PDF](https://delivery.acm.org/10.1145/3110000/3107489/p73-johansen.pdf)[A. Johansen](#), C. Sønderby, S. Sønderby and O. Winther

### A deep learning approach to adherence detection for type 2 diabetics

POSTER

IEEE ENGINEERING IN MEDICINE AND BIOLOGY SOCIETY (EMBC)

2017

[HTTPS://IEEEEXPLORE.IEEE.ORG/STAMP/STAMP.JSP?ARNUMBER=7471776](https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=7471776)A. Mohebbi, T. Aradóttir, [A. Johansen](#), H. Bengtsson, M. Fraccaro, M. Mørup

## Epileptiform spike detection via convolutional neural networks

IEEE INTERNATIONAL CONFERENCE ON ACOUSTICS, SPEECH AND SIGNAL PROCESSING

<https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=8037462>

A. Johansen, J. Jin, T. Maszczyk, J. Dauwels, S. Cash and M. Westover

POSTER

2016

## Workshop and Abstract Publications

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### Measuring arithmetic extrapolation performance

NEURIPS WORKSHOP ON SCIENCE MEETS ENGINEERING OF DEEP LEARNING

<https://arxiv.org/abs/1910.01888>

A. Madsen, A. Johansen

POSTER

2019

### Language modeling for biological sequences — curated datasets and baselines

NEURIPS WORKSHOP ON LEARNING MEANINGFUL REPRESENTATIONS OF LIFE

J. Armenteros, A. Johansen, O. Winther, H. Nielsen

POSTER

2019

### Learning the language of life

INTELLIGENT SYSTEMS FOR MOLECULAR BIOLOGY / EUROPEAN CONFERENCE ON COMPUTATIONAL BIOLOGY

[https://orbit.dtu.dk/files/193584092/Learning\\_the\\_language\\_of\\_life\\_abstract.pdf](https://orbit.dtu.dk/files/193584092/Learning_the_language_of_life_abstract.pdf)

J. Armenteros, A. Johansen, O. Winther, H. Nielsen

ORAL

2019

### Learning when to skim and when to read

ACL WORKSHOP ON REPRESENTATION LEARNING FOR NLP

<https://arxiv.org/abs/1712.05483>

A. Johansen, R. Socher

POSTER

2017

### Neural machine translation with characters and hierarchical encoding

NIPS RECURRENT NEURAL NETWORK SYMPOSIUM

<https://arxiv.org/abs/1610.06550>

A. Johansen, J. Hansen, E. Obeid, C. Sønderby and O. Winther

POSTER

2016

## Current Projects

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### Prediction of GPI-Anchored proteins with pointer neural networks

TO BE SUBMITTED FOR SUBMITTED TO CURRENT RESEARCH IN BIOTECHNOLOGY

<https://www.biorxiv.org/content/10.1101/838680v1.abstract>

M. Gislason, H. Nielsen, J. Armenteros\*, A. Johansen\* (\*equal contribution)

TO BE SUBMITTED

### Predicting recombinant gene expression with deep learning techniques

TO BE SUBMITTED FOR JOURNAL OF BIOTECHNOLOGY (IF: 3.1)

H. Martiny, J. Armenteros, A. Johansen, J. Salomon, H. Nielsen

TO BE SUBMITTED

### Language modeling for biological sequences — curated datasets and baselines

TO BE SUBMITTED FOR BIOINFORMATICS (IF: 4.5) BY SEP 2020

<https://github.com/alrojo/UniLanguage/blob/master/preprint.pdf>

J. Armenteros\*, A. Johansen\*, O. Winther, H. Nielsen (\*equal contribution)

TO BE SUBMITTED

## Patents

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### Probability-Based Guider

US PATENT APP. 15/853,530

A. Johansen, B. McCann, J. Bradbury, R. Socher

PENDING

2017

### Deep Neural Network-Based Decision Network

US PATENT APP. 15/853,570

A. Johansen, B. McCann, J. Bradbury, R. Socher

PENDING

2017

## Technical Skills

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**Programming** Python, Matlab, SQL, Java

**ML Frameworks** PyTorch, TensorFlow, Theano, Lasagne, CUDA

**Others** Linux, Docker, Vim, IPythonNotebook, Google Colab, Git, Github, AWS S3, AWS EC2,  $\text{\LaTeX}$