Michiel Straat

Curriculum Vitae

Nijenborgh 9, office 594
9747AG Groningen
The Netherlands
michielstraat@gmail.com/m.j.c.straat@rug.nl
michielstraat.com

Current position

10/2018-Present **PhD candidate**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen, The Netherlands
Thesis title: "Machine Learning: Statistical physics-based theory and smart industry applications"

Previous Positions and Experience

12/2020-01/2022 **Research Partner**, *Philips Innovation Center*, Drachten, The Netherlands
Project: Real-time quality control in high-throughput production lines

06/2017-12/2017 **Intern**, *Philips Innovation Center*, Drachten, The Netherlands
Project: Predicting material properties from Eddy Current measurements
Supervisors: Nick Goet and Jan Siegersma
Grade: 9

07/2010-06/2014 **Software consultant**, *Self-employed*, Leeuwarden, The Netherlands

Education

09/2016-09/2018 **Master's Degree in Computing Science (Specialization: Intelligent Systems and Visualization)**, *Faculty of Science and Engineering*, University of Groningen, Distinction: Cum Laude
Thesis: On-line Learning in Neural Networks with ReLU Activations
Supervisors: Prof. Dr. Michael Biehl and Dr. Kerstin Bunte
Grade: 9.5

09/2013-08/2016 **Bachelor's Degree (Dutch Dipl.- Inform.) in Computing Science**, *Faculty of Science and Engineering*, University of Groningen
Thesis: Time Series Classification in Complex Fourier Space
Supervisors: Prof. Dr. Michael Biehl and MSc. Friedrich Melchert
Grade: 9

08/2007-07/2013 **High School degree**, *Stedelijk Gymnasium (Grammar school)*, Leeuwarden, The Netherlands, Degree: Nature and Technology + Health (Dutch: Natuur en Techniek + Gezondheid (NT/NG))
Additional courses: Computer Science and Economics

Publications

2022 **Straat, Michiel**, Koster, Kevin, Goet, Nick, and Bunte, Kerstin. **July 2022**. "An Industry 4.0 example: real-time quality control for steel-based mass production using Machine Learning on non-invasive sensor data". In: IEEE. DOI: 10.48550/ARXIV.2206.05818. URL: https://arxiv.org/abs/2206.05818.

2021 Münch, M., **Straat, M.**, Biehl, M., and Schleif, F-M. **Apr. 2021**. "Complex-valued embeddings of generic proximity data". In: *Structural, Syntactic, and Statistical Pattern Recognition*. Vol. 12644. Springer International Publishing, pp. 14–23. DOI: 10.1007/978-3-030-73973-7. URL: https://arxiv.org/abs/2008.13454.

Straat, M., Abadi, F., Kan, Z., Göpfert, C., Hammer, B., and Biehl, M. **Apr. 2021**.

"Supervised learning in the presence of concept drift: a modelling framework". In: *Neural Computing and Applications*. ISSN: 1433-3058. DOI: 10.1007/s00521-021-06035-1.

Oostwal, E., **Straat, M.**, and Biehl, M. **Feb. 2021**. "Hidden unit specialization in layered neural networks: ReLU vs. sigmoidal activation". In: *Physica A: Statistical Mechanics and its Applications* 564, p. 125517. ISSN: 0378-4371. DOI: 10.1016/j.physa.2020.125517.

2019 **Straat, M.** and Biehl, M. **Apr. 2019**. "On-line learning dynamics of ReLU neural networks using statistical physics techniques". In: *Proc. European Symposium on Artificial Neural Networks (ESANN) 2019, Bruges/Belgium*. Ed. by M. Verleysen.

Straat, M., Kaden, M., Gay, M., Villmann, T., Lampe, A., Seiffert, U., Biehl, M., and Melchert, F. **Mar. 2019**. "Learning vector quantization and relevances in complex coefficient space". In: *Neural Computing and Applications*. ISSN: 1433-3058. DOI: 10.1007/s00521-019-04080-5. URL: https://doi.org/10.1007/s00521-019-04080-5.

2018 **Straat, M.**, Abadi, F., Göpfert, C., Hammer, B., and Biehl, M. **Oct. 2018**. "Statistical Mechanics of On-Line Learning Under Concept Drift". In: *Entropy* 20.10. ISSN: 1099-4300. DOI: 10.3390/e20100775. URL: http://www.mdpi.com/1099-4300/20/10/775.

2017 **Straat, M.**, Kaden, M., Gay, M., Villmann, T., Lampe, A., Seiffert, U., Biehl, M., and Melchert, F. **July 2017**. "Prototypes and matrix relevance learning in complex fourier space". In: *2017 12th International Workshop on Self-Organizing Maps and Learning Vector Quantization, Clustering and Data Visualization (WSOM)*, pp. 1–6. DOI: 10.1109/WSOM.2017.8020019.

Talks

23/08/2022 **An Industry 4.0 example: real-time quality control for steel-based mass production using Machine Learning on non-invasive sensor data**, *The 14th Mittweida Workshop on Computational Intelligence*, Mittweida, Germany
Slides

20/07/2022 **An Industry 4.0 example: real-time quality control for steel-based mass production using Machine Learning on non-invasive sensor data**, *World Congress on Computational Intelligence (WCCI), International Joint Conference on Neural Networks (IJCNN) 2022*, Padua, Italy
Slides

03/03/2021 **Feedback Alignment methods for training neural networks**, *Intelligent Systems March Seminar*, Groningen, The Netherlands
Slides

12/08/2020 **Dynamics of on-line learning in two-layer neural networks in the presence of concept drift**, *Summer Workshop on Statistical Physics and Machine Learning*, École de physique des Houches, Les Houches, France
Recording and Slides

02/07/2020 **Dynamics of on-line learning in two-layer neural networks in the presence of concept drift**, *The 12th Mittweida Workshop on Computational Intelligence*, Mittweida, Germany (online)
Abstract

12/09/2019 **Towards a statistical physics analysis of multilayer ReLU neural networks**, *The 11th Mittweida Workshop on Computational Intelligence*, Hochschule Mittweida, Germany
Slides, Abstract

26/04/2019 **On-line learning dynamics of ReLU neural networks using statistical physics techniques**, *European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning - ESANN 2019*, Bruges, Belgium
Slides

29/06/2017 **Prototypes and matrix relevance learning in complex Fourier space**, *12th International Workshop on Self-Organizing Maps and Learning Vector Quantization, Clustering and Data Visualization*, Laboratoire Lorrain de Recherche en Informatique et ses Applications (Loria), Nancy, France
Slides

04/2017 **Segmentation of blood vessels in retinal fundus images**, *SC@RUG2017*, University of Groningen, The Netherlands
Slides

Teaching

Teaching Assistant

11/2020-02/2021 **Neural Networks and Computational Intelligence**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

09/2020-11/2020 **Modelling and Simulation**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

11/2019-01/2020 **Advanced Algorithms and Data Structures**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

09/2019-11/2019 **Modelling and Simulation**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

09/2017-11/2017 **Information Security**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

09/2016-11/2016 **Information Security**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

(Co-)Supervision

2021 **MSc. Thesis**, *P. Eilers*, University of Groningen

2020 **MSc. Internship**, *P. Eilers*, University of Groningen

2020 **MSc. Internship**, *N. Tamboli*, University of Groningen

2020 **MSc. Thesis**, *E. Oostwal*, University of Groningen

2019 **MSc. Internship**, *E. Oostwal*, University of Groningen

2019 **MSc. Thesis**, *Z. Kan*, University of Groningen

Awards and accomplishments

2017 **Best Paper Award**, *Computer Science Student Colloquium*, University of Groningen
Paper: Segmentation of Blood Vessels in Retinal Fundus Images
Expert grade: 9.5

2016 **Best Presentation Award**, *BSc. Theses Symposium*, University of Groningen
Title: Time Series Classification in Complex Fourier Space
Experts grade: 9.0

Programming languages

- Python
- Mathematica

- Matlab
- C/C++

Schools attended

09/2021-09/2021 **Gaussian Process and Uncertainty Quantification Summer School 2021**, University of Sheffield (online)

08/2020-08/2020 **Summer Workshop on Statistical Physics and Machine Learning**, *École de physique des Houches*, Les Houches, France

09/2014-04/2015 **C/C++**, *Institute for Mathematics and Informatics*, University of Groningen
Lecturer: Prof. Dr. F.B. Brokken (Course website)

Organization and Leadership

01/2017-04/2017 **Head of the organization of the 14th Student Colloquium**, *Faculty of Science and Engineering*, University of Groningen

11/2019-03/2020 **Head of Teaching Assistants of the Advanced Algorithms and Data Structures course**, *Faculty of Science and Engineering*, University of Groningen

01/2021-05/2022 **Organization of the Intelligent Systems group seminars**, *Bernoulli Institute for Mathematics, Computer Science and Artificial Intelligence*, University of Groningen

Languages

Dutch	Mother tongue
English	Fluent
German	B2
Russian	A2

References

- Michael Biehl (Website, e-mail: m.biehl@rug.nl)
- Kerstin Bunte (Website, e-mail: k.bunte@rug.nl)
- Nick Goet (e-mail: nick.goet@philips.com)