Michiel Straat

Curriculum Vitae

Nijenborgh 9, office 594
9747AG Groningen
The Netherlands
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Current position

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

Previous Positions and Experience

12/2020-01/2022 **Philips**, *Partner in project: Machine Learning in Industrial Environments*, Drachten, The Netherlands

06/2017-12/2017 **Philips**, *Data Science Internship: Machine Learning in Industrial Environments*, Drachten, The Netherlands

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

Education

09/2016-09/2018 **Master's Degree in Computing Science (Specialization: Intelligent Systems and Visualization)**, *University of Groningen*, Faculty of Science and Technology, Distinction: Cum Laude, avg. grade 9.0
Thesis: On-line Learning in Neural Networks with ReLU Activations
Supervisors: Prof. Dr. Michael Biehl and Dr. Kerstin Bunte

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

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

Languages

Dutch (mother tongue), English (fluent), German (B2), Russian (A2)

Publications

2022 Straat, Michiel, Kevin Koster, Nick Goet, and Kerstin Bunte (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., M. Straat, M. Biehl, and F-M Schleif (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.

Oostwal, E., M. Straat, and M. Biehl (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.

Straat, M., F. Abadi, Z. Kan, C. Göpfert, B. Hammer, and M. Biehl (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.

2019 Straat, M. and M. Biehl (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., M. Kaden, M. Gay, T. Villmann, A. Lampe, U. Seiffert, M. Biehl, and F. Melchert (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., F. Abadi, C. Göpfert, B. Hammer, and M. Biehl (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., M. Kaden, M. Gay, T. Villmann, A. Lampe, U. Seiffert, M. Biehl, and F. Melchert (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.

Teaching

Teaching Assistant

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

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

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

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

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

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

(Co-)Supervision

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

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

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

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

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

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

Awards and accomplishments

2017 **Best Paper Award**, *Computer Science Student Colloquium*, Paper: Segmentation of Blood Vessels in Retinal Fundus Images

2016 **Best Presentation Award**, *BSc. Thesis Symposium*, Thesis: Time Series Classification in Complex Fourier Space, Average expert grade: 8.8
Thesis grade: 9

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*, 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**, *University of Groningen*, The Netherlands, Slides

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++**, *University of Groningen*, Lecturer: Prof. Dr. F.B. Brokken

Organization

01/2021-05/2022 **Organization of seminars of the Intelligent Systems group**, *University of Groningen*