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Understanding deep meta-learning

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Curriculum Vitae

Education

Leiden University

Doctor of Philosophy (PhD) in Computer Science,
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March 2021 - August 2023

Leiden University

Master of Computer Science: Data Science, *Summa Cum Laude*
Thesis: Revisiting Learned Optimizers in Few-Shot Settings

September 2019 - February 2021

Utrecht University

Bachelor of Science in Artificial Intelligence, *Cum Laude*
Thesis: Machine Learning in the Fight against Internet Toxicity

September 2016 - July 2019

University of Applied Sciences Leiden

First-year diploma Computer Science

September 2015 - July 2016

List of publications

- Huisman, M., Moerland, T. M., Plaat, A., & van Rijn, J. N. (2023). Are LSTMs good few-shot learners? *Machine Learning*, 112, 4635–4662. Springer.
- Huisman, M., Plaat, A. & van Rijn, J. N. (2023). Subspace Adaptation Prior for Few-Shot Learning. *Machine Learning*. Springer.
- Huisman, M., van Rijn, J. N., & Plaat, A. (2023). Understanding Transfer Learning and Gradient-Based Meta-Learning Techniques. Accepted for publication in *Machine Learning*. Springer.
- Ullah, I., Carrión-Ojeda, D., Escalera, S., Guyon, I., Huisman, M., Mohr, F., ... & Vu, P. A. (2022). Meta-album: Multi-domain meta-dataset for few-shot image classification. *Advances in Neural Information Processing Systems*, 35, 3232-3247.
- El Baz, A., Ullah, I., Alcobaça, E., Carvalho, A.C., Chen, H., Ferreira, F., Gouk, H., Guan, C., Guyon, I., Hospedales, T. & Hu, S. (2021). Lessons learned from the NeurIPS 2021 MetaDL challenge: Backbone fine-tuning without episodic meta-learning dominates for few-shot learning image classification. In *NeurIPS 2021 Competition and Demonstration Track*.
- Huisman, M., Plaat, A. & van Rijn, J. N. (2021). A preliminary study on the feature representations of transfer learning and gradient-based meta-learning techniques. In *Fifth Workshop on Meta-Learning at the Conference on Neural Information Processing Systems*.
- Huisman, M., Plaat, A., & van Rijn, J. N. (2022). Stateless neural meta-learning using second-order gradients. *Machine Learning*, 111(9), 3227-3244. Springer.
- Huisman, M., van Rijn, J. N., Plaat, A. (2022). Metalearning for deep neural networks. In Brazdil, P., van Rijn, J. N., Soares, C., & Vanschoren, J. (2nd Edition). *Metalearning: Applications to Automated Machine Learning and Data Mining*, chapter 13, pages 237-267. Springer Nature.
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