

David W. Romero

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Biography

I am a Research Scientist in Efficient Generative AI at NVIDIA, and a finishing PhD candidate at the Vrije Universiteit Amsterdam. I am primarily interested in continuous parameterizations and relaxations of neural components and their use to improve efficiency aspects of Deep Learning. For instance, [CKConvs](#) can model long context with low parameter and time costs that can be efficiently extended to millions of tokens.^{1,2} In my free time, I enjoy learning about new things, e.g., coffee, carpentry, and doing sports.

Work Experience

- 2023 – ... **Research Scientist**
NVIDIA, Deep Imagination Research Lab
Research on efficient deep generative AI.
- 2022 – 2023 **Student Researcher**
Google Research, Paris, France
Research on efficient learning of entire neural architectures by backpropagation.
- 2021 – 2022 **AI Research Intern**
Qualcomm AI Research, Amsterdam, The Netherlands
Research on the effect of equivariance in neural compression.
- 2021 – 2021 **Research Consultant**
Mitsubishi Electric Research Laboratories, Cambridge, MA, USA (Remote)
Research on how equivariance to symmetries can be learned from data.
- 2017 – 2018 **R&D Computer Vision Developer**
Corning Optical Communications GmbH, Berlin, Germany
Development of an automated, vision-aided coupling station for optic fibers.

Education

- 2018 – ... **Ph.D. in Efficient Deep Learning**
Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
Supervisors: Erik Bekkers, Jakub Tomczak, Mark Hoogendoorn.
- 2016 – 2018 **M.Sc. Computational Engineering Sciences**
Technische Universität Berlin, Berlin, Germany
Grade: 91 / 100 [Among the 10% best graduates].
- 2010 – 2016 **B.Sc. Mechatronics Engineering (5-year degree)**
Universidad Nacional de Colombia, Bogotá, Colombia
- 2014 – 2015 **Exchange Year in Mechatronics Engineering**
Leibniz Universität Hannover, Hannover, Germany

Publications

Preprints

- 1 E. J. Bekkers, S. Vadgama, R. D. Hesselink, P. A. van der Linden, and **D. W. Romero**, *Fast, expressive SE(n) equivariant networks through weight-sharing in position-orientation space*, 2023.
- 2 A. Urbano and **D. W. Romero**, *Self-supervised detection of perfect and partial input-dependent symmetries*, 2023.

- 3 **D. W. Romero**, E. J. Bekkers, J. M. Tomczak, and M. Hoogendoorn, *Wavelet networks: Scale equivariant learning from raw waveforms*, 2020. [URL: https://arxiv.org/abs/2006.05259](https://arxiv.org/abs/2006.05259).

Conference Publications

- 1 D. M. Knigge*, **D. W. Romero***, A. Gu, E. Gavves, E. J. Bekkers, J. M. Tomczak, M. Hoogendoorn, and J.-J. Sonke, “Modelling long range dependencies in ND: From task-specific to a general purpose CNN,” in *International Conference on Learning Representations*, 2023. [URL: https://openreview.net/forum?id=ZW5aK4yCRqU](https://openreview.net/forum?id=ZW5aK4yCRqU).
- 2 S. Massaroli, M. Poli, D. Y. Fu, H. Kumbong, **D. W. Romero**, R. N. Parnichkun, A. Timalsina, Q. McIntyre, B. Chen, A. Rudra, C. Zhang, C. Re, S. Ermon, and Y. Bengio, “Laughing hyena distillery: Extracting compact recurrences from convolutions,” in *Advances in Neural Information Processing Systems*, 2023.
- 3 D. M. Knigge, **D. W. Romero**, and E. J. Bekkers, “Exploiting redundancy: Separable group convolutional networks on lie groups,” in *International Conference on Machine Learning*, PMLR, 2022, pp. 11 359–11 386. [URL: https://proceedings.mlr.press/v162/knigge22a.html](https://proceedings.mlr.press/v162/knigge22a.html).
- 4 T. F. van der Ouderaa, **D. W. Romero**, and M. van der Wilk, “Relaxing equivariance constraints with non-stationary continuous filters,” in *Advances in Neural Information Processing Systems*, 2022. [URL: https://openreview.net/forum?id=5oEk8fvJxny](https://openreview.net/forum?id=5oEk8fvJxny).
- 5 **D. W. Romero**, A. Kuzina, E. J. Bekkers, J. M. Tomczak, and M. Hoogendoorn, “CKConv: Continuous kernel convolution for sequential data,” in *International Conference on Learning Representations*, 2022. [URL: https://openreview.net/forum?id=8FhxBtXSl0](https://openreview.net/forum?id=8FhxBtXSl0).
- 6 **D. W. Romero** and S. Lohit, “Learning partial equivariances from data,” in *Advances in Neural Information Processing Systems*, 2022. [URL: https://openreview.net/forum?id=pNHT6oBaPr8](https://openreview.net/forum?id=pNHT6oBaPr8).
- 7 **D. W. Romero***, R.-J. Brintjes*, J. M. Tomczak, E. J. Bekkers, M. Hoogendoorn, and J. van Gemert, “FlexConv: Continuous kernel convolutions with differentiable kernel sizes,” in *International Conference on Learning Representations*, 2022. [URL: https://openreview.net/forum?id=3jooF27-0Wy](https://openreview.net/forum?id=3jooF27-0Wy).
- 8 **D. W. Romero** and J.-B. Cordonnier, “Group equivariant stand-alone self-attention for vision,” in *International Conference on Learning Representations*, 2021. [URL: https://openreview.net/forum?id=JkfYjn0Eo6M](https://openreview.net/forum?id=JkfYjn0Eo6M).
- 9 **D. W. Romero**, E. Bekkers, J. Tomczak, and M. Hoogendoorn, “Attentive group equivariant convolutional networks,” in *International Conference on Machine Learning*, PMLR, 2020, pp. 8188–8199. [URL: https://proceedings.mlr.press/v119/romero20a.html](https://proceedings.mlr.press/v119/romero20a.html).
- 10 **D. W. Romero** and M. Hoogendoorn, “Co-attentive equivariant neural networks: Focusing equivariance on transformations co-occurring in data,” in *International Conference on Learning Representations*, 2020. [URL: https://openreview.net/forum?id=r1g6ogrtDr](https://openreview.net/forum?id=r1g6ogrtDr).

Workshop Publications

- 1 P. A. van der Linden*, **D. W. Romero***, and E. J. Bekkers, “Learned gridification for efficient processing of point clouds,” *Topology, Algebra and Geometry in Machine Learning Workshop (ICML)*, 2023.
- 2 **D. W. Romero** and N. Zeghidour, “DNArch : Learning convolutional neural architectures by backpropagation,” *Differentiable Almost Everything: Differentiable Relaxations, Algorithms, Operators, and Simulators Workshop (ICML)*, 2023. [URL: https://arxiv.org/abs/2302.05400](https://arxiv.org/abs/2302.05400).
- 3 **D. W. Romero***, D. M. Knigge*, A. Gu, E. J. Bekkers, E. Gavves, J. M. Tomczak, and M. Hoogendoorn, “Towards a general purpose CNN for long range dependencies in ND,” *Workshop on Continuous Time Methods for Machine Learning (ICML)*, 2022. [URL: https://arxiv.org/abs/2206.03398](https://arxiv.org/abs/2206.03398).

Awards

- 2021  **Winner Qualcomm Innovation Fellowship**
Proposal: *Continuous Kernel Convolutions for Machine Learning*
- 2013  **Member of the Mejores Promedios Exchange Program**
Universidad Nacional de Colombia, Bogotá, Colombia
Exchange program consisting of the best performing students of the engineering faculty.
- 2012  **Scholarship Grantee**
Universidad Nacional de Colombia, Bogotá, Colombia
Granted to the best 15 students of the engineering faculty.
- 2009  **Ranked among the top 0.2% students on the ICFES exam in Colombia. Best of the city**
Acknowledged by the city council, Garzón, Huila, Colombia

Languages

 English (C1)  Dutch (C1)  German (B2/C1)  Spanish (Native)

References

Available on Request