ROBERT-JAN BRUINTJES

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I am a PhD candidate in Computer Vision, working with Jan van Gemert at Delft University of Technology, the Netherlands. I study Deep Neural Networks for Computer Vision, like CNNs and Vision Transformers, and how they learn to do their job. Topics of choice include learned equivariance, position information and the inductive bias of the self-attention operation.

SELECTED PUBLICATIONS

APRIL 2023

WHAT AFFECTS LEARNED EQUIVARIANCE IN DEEP IMAGE RECOGNITION MODELS? / 2ND WORKSHOP ON LEARNING WITH LIMITED LABELLED DATA FOR IMAGE AND VIDEO UNDERSTANDING (CVPRW 2023)

Robert-Jan Bruintjes*, Tomasz Motyka*, Jan van Gemert (*equal contribution)
We quantify learned equivariance in deep image recognition models, by proposing an improved measure for equivariance. We find evidence for a correlation between learned translation equivariance and validation accuracy on ImageNet. We therefore investigate what can increase the learned equivariance in neural networks.

OCTOBER 2021

FLEXCONV: CONTINUOUS KERNEL CONVOLUTIONS WITH DIFFERENTIABLE KERNEL SIZES / ICLR 2022 (POSTER)

David W. Romero*, Robert-Jan Bruintjes*, Jakub M. Tomczak, Erik J. Bekkers, Mark Hoogendoorn, Jan C. van Gemert (*equal contribution)
We propose FlexConv, a novel convolutional operation with which high bandwidth convolutional kernels of learnable kernel size can be learned at a fixed parameter cost. Additionally, FlexNets can be deployed at higher resolutions than those seen during training.

JULY 2017

CAUSAL DISCOVERY WITH LONG SHORT-TERM MEMORY / MASTER THESIS

Robert-Jan Bruintjes, supervision by Efstratios Gavves, Joris Mooij (University of Amsterdam)

AWARDS & GRANTS

SEPTEMBER 2021

OUTSTANDING REVIEWER / ICCV 2021 & ECCV 2022

OCTOBER 2021

NWO / COMPUTING TIME ON NATIONAL COMPUTER FACILITIES (SMALL)

Title: **Visual Inductive Priors for Data-Efficient Deep Learning**
Press release: https://www.nwo.nl/en/news/nwo-grants-eight-applications-computing-time-national-computer-facilities-1

EXPERIENCE

SEPTEMBER 2019 – SEPTEMBER 2023

PHD CANDIDATE / DELFT UNIVERSITY OF TECHNOLOGY

Supervisor: dr. Jan C. van Gemert
I work on integrating prior knowledge into Computer Vision, to benefit data efficiency and robustness of vision models. My methods of choice concern reparameterizations of neural network operators, for example, neural implicit convolutional kernel representations (see my FlexConv work), group equivariant convolutions and self-attention.

I am co-organizer of the VIPriors workshop series (https://vipriors.github.io), with editions at ECCV/ICCV from 2020 to 2023. As organizer I have been responsible for the challenge track and paper track of the workshop, as well as being the host of all editions' live sessions.

JULY 2022 – SEPTEMBER 2022

THREE MONTH VISIT TO BETHGE LAB / UNIVERSITY OF TÜBINGEN

I collaborated with prof. Matthias Bethge and dr. Matthias Kümmerer on a project investigating the benefits of scale equivariance (to be published).

APRIL 2017 – AUGUST 2019

(LEAD) DEEP LEARNING ENGINEER / SIGHTCORP

Sightcorp is an AI spin-off from the University of Amsterdam specializing in face analysis software. At Sightcorp I applied state-of-the-art Deep Learning for Computer Vision while constrained by business priorities and maintaining a solid code base for repeatable experimentation.

JULY 2016 – AUGUST 2017

RESEARCH ASSISTANT / VRIJE UNIVERSITEIT AMSTERDAM

Supervised by dr. Annette Ten Tije.

MARCH 2015 – MARCH 2016

RESEARCH ASSISTANT / UNIVERSITEIT VAN AMSTERDAM

Supervised by dr. Thomas Mensink at UvA.

EDUCATION

JULY 2017

MSC ARTIFICIAL INTELLIGENCE / UNIVERSITEIT VAN AMSTERDAM

Completed the tracks Machine Learning and Natural Language Processing.

SEPTEMBER 2014

BSC COMPUTER SCIENCE / UNIVERSITEIT UTRECHT

Completed the minor Technical Artificial Intelligence.

OTHER PUBLICATIONS

VIPriors 1: Visual Inductive Priors for Data-Efficient Deep Learning Challenges. Robert-Jan Bruintjes, Attila Lengyel, Marcos Baptista Rios, Osman Semih Kayhan, Jan van Gemert. *arXiv preprint arXiv:2103.03768.*

VIPriors 2: Visual Inductive Priors for Data-Efficient Deep Learning Challenges. *Robert-Jan Attila Lengyel, Robert-Jan Bruintjes, Marcos Baptista Rios, Osman Semih Kayhan, Davide*

Zambrano, Nergis Tomen, Jan van Gemert. arXiv preprint arXiv:2201.08625.

Domain Adaptation for Rare Classes Augmented with Synthetic Samples. Tuhin Das, Robert-Jan Bruintjes, Attila Lengyel, Jan van Gemert, Sara Beery. *arXiv preprint arXiv:2110.12216*