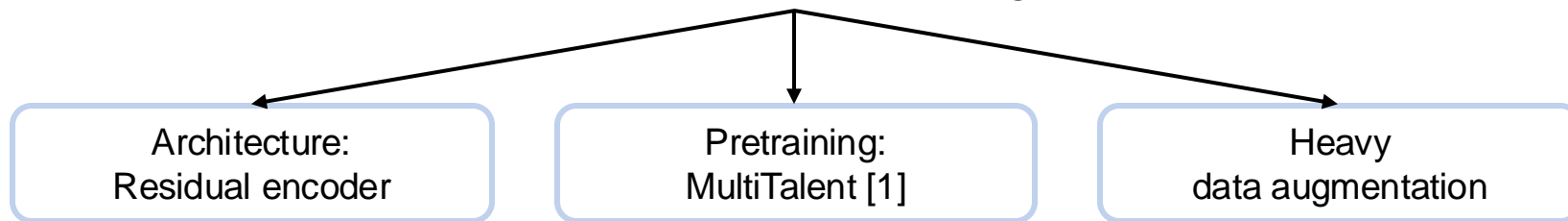


**Exploring the out-of-distribution
generalization of nnU-Net for fetal brain
tissue segmentation**

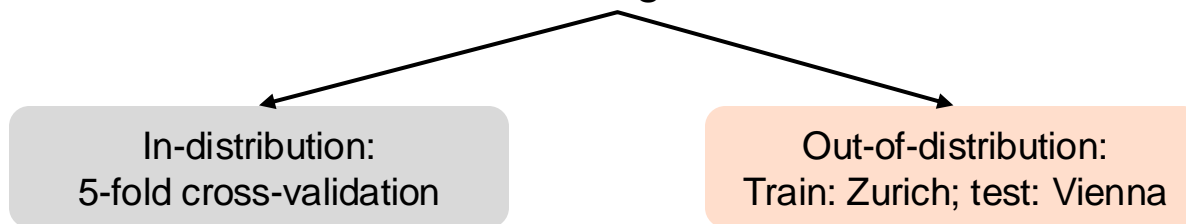
Maximilian Zenk, Michael Baumgartner, Klaus Maier-Hein
Division of Medical Image Computing, DKFZ

nnU-Net methodology

How to improve (out-of-distribution) generalization?



How to evaluate generalization?



[1] Ulrich, Constantin, et al. "Multitalent: A multi-dataset approach to medical image segmentation." MICCAI 2023.

Results

Out-of-distribution testing (40 cases)

Model	mean DSC	σ
nnU-Net	46.05	10.56
nnU-Net Res. encoder	49.75	15.25
nnU-Net Res. encoder (pretrained)	46.83	14.53
nnU-Net + BN + DA	48.04	16.57
nnU-Net Res. encoder + BN + DA	52.29	18.71
nnU-Net Res. encoder (pretrained) + BN + DA	52.61	19.96

better generalization through strong data augmentation (DA) and residual encoder

In-distribution testing (120 cases)

Model	mean DSC	σ
★ nnU-Net	85.17	5.79
★ nnU-Net (batch size 4)	85.09	5.82
nnU-Net Res. encoder	84.85	6.03
★ nnU-Net Res. encoder (pretrained) + BN + DA	84.64	6.13

No model beats base nnU-Net

Final submission: Ensemble ★
(retrained on full training data)