

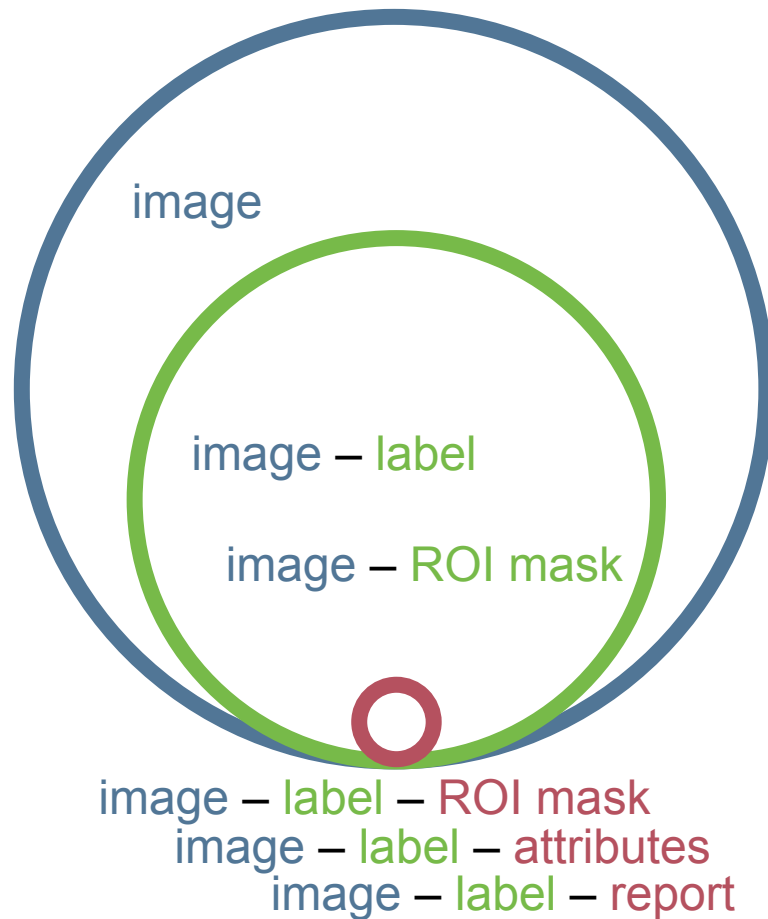
Minimum Data, Maximum Impact: 20 annotated samples for explainable lung nodule classification

Luisa Gallée^{1,2,3}, Catharina S. Lisson², Christoph G. Lisson², Daniela Drees², Felix Weig², Daniel Vogelee², Meinrad Beer^{2,3}, Michael Götz^{1,2,3}

¹ Experimental Radiology, Ulm University Medical Center, Ulm

² Department of Diagnostic and Interventional Radiology, Ulm University Medical Center, Ulm, Germany

³ XAIRAD - Cooperation for Artificial Intelligence in Experimental Radiology, Ulm, Germany



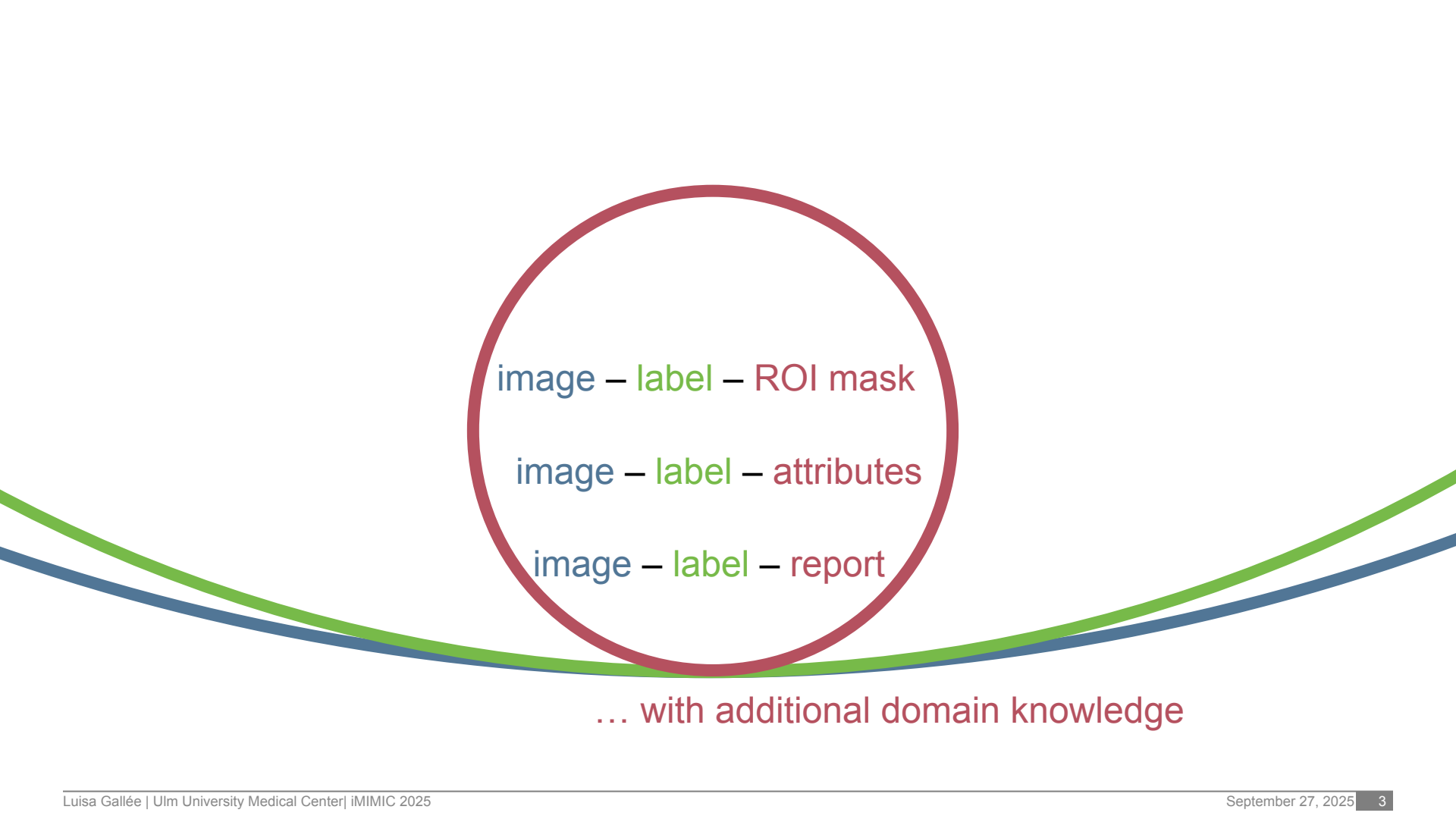


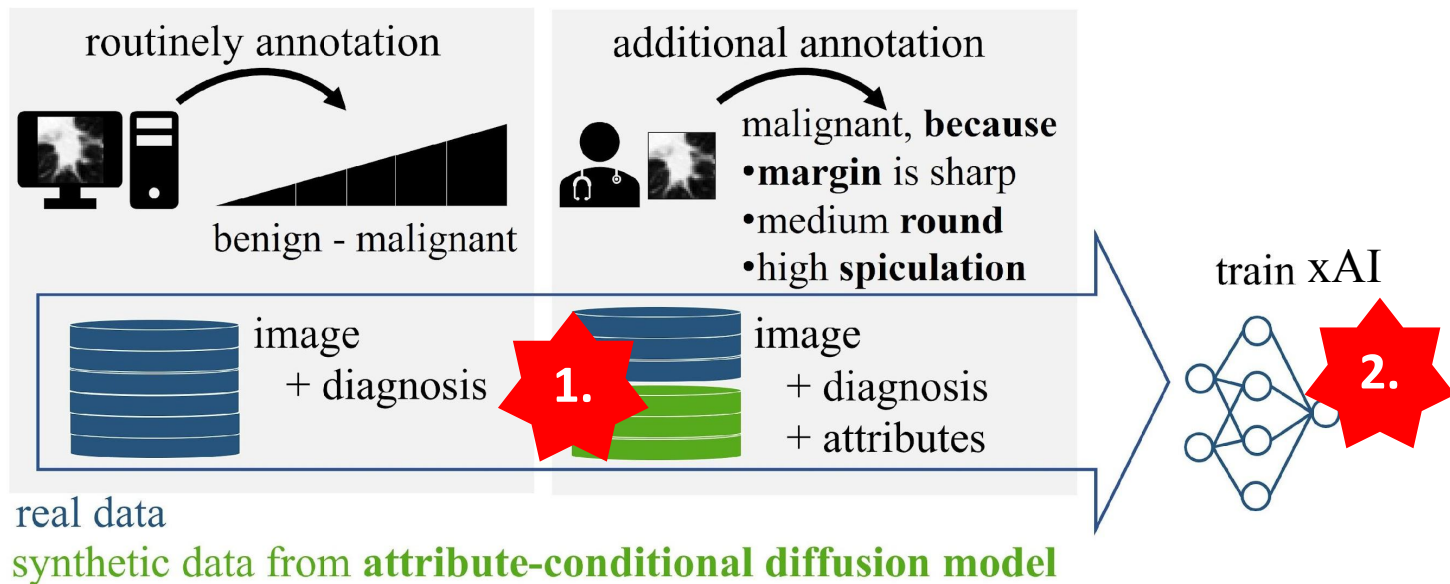
image – label – ROI mask

image – label – attributes

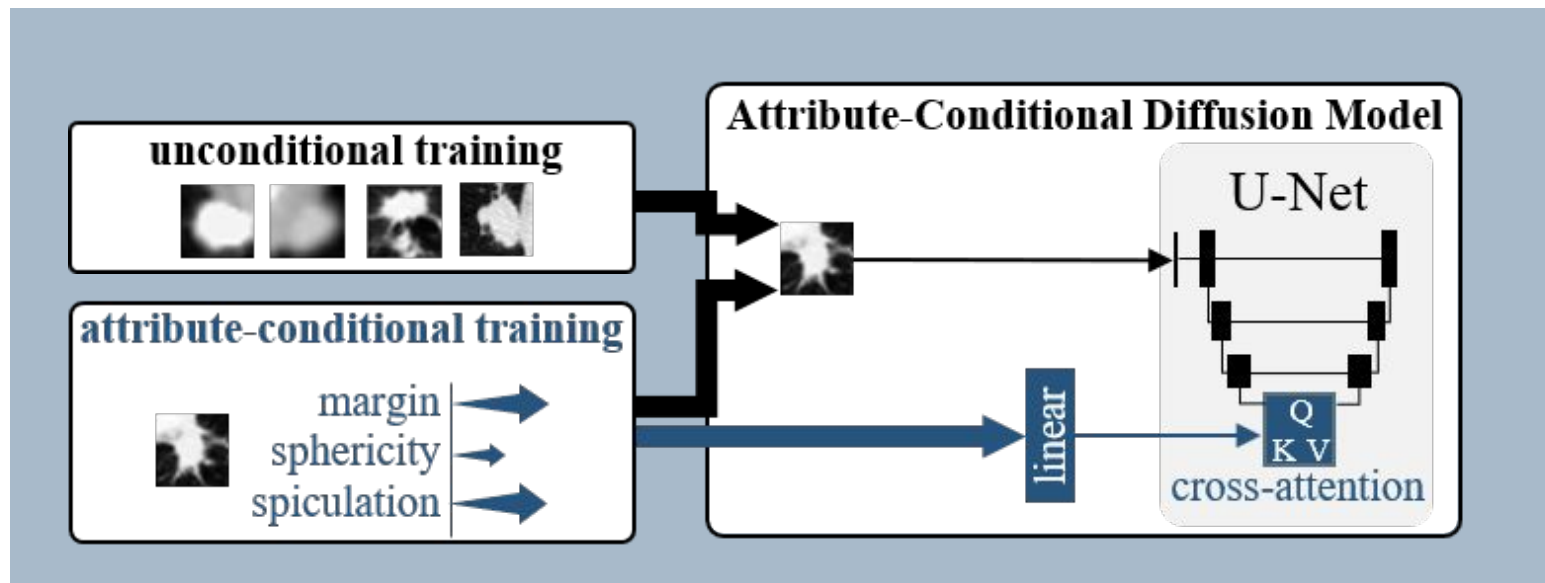
image – label – report

... with additional domain knowledge

Additional Domain Knowledge = Additional Annotation



Semi-Conditional Training



Quantitative evaluation of synthetic data

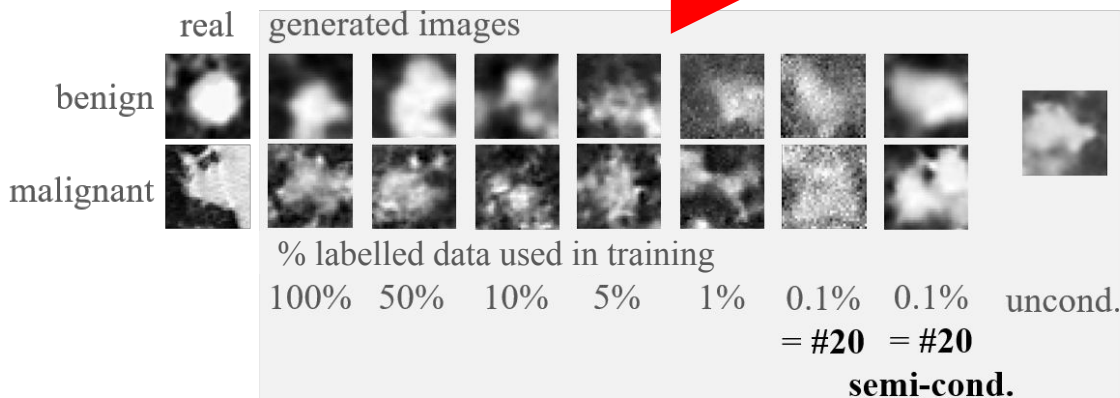
Do the images look realistic?

LIDC-IDRI annotation

target: malignancy

attributes:

- calcification
- Internal structure
- lobulation
- margin
- sphericity
- spiculation
- subtlety
- texture



SSIM: Structural Similarity Index Measure

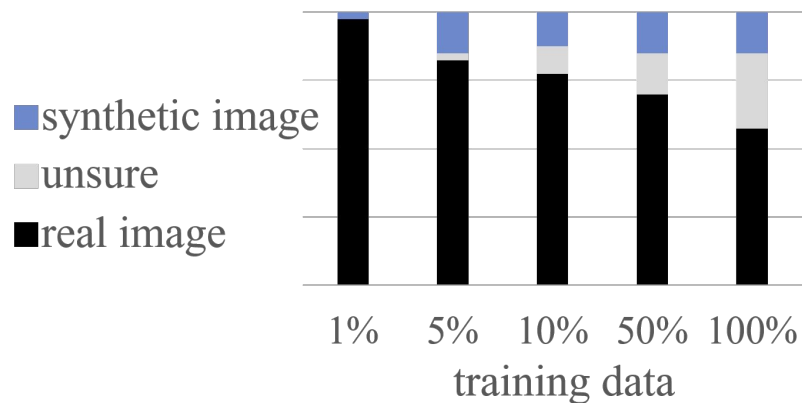
FID: Fréchet Inception Distance

LPIPS: Learned Perceptual Image Patch Similarity

User study to assess realism

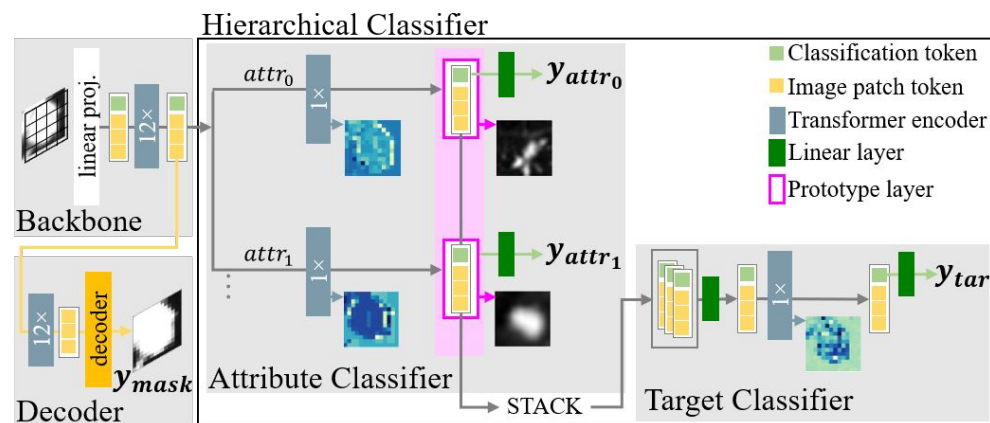
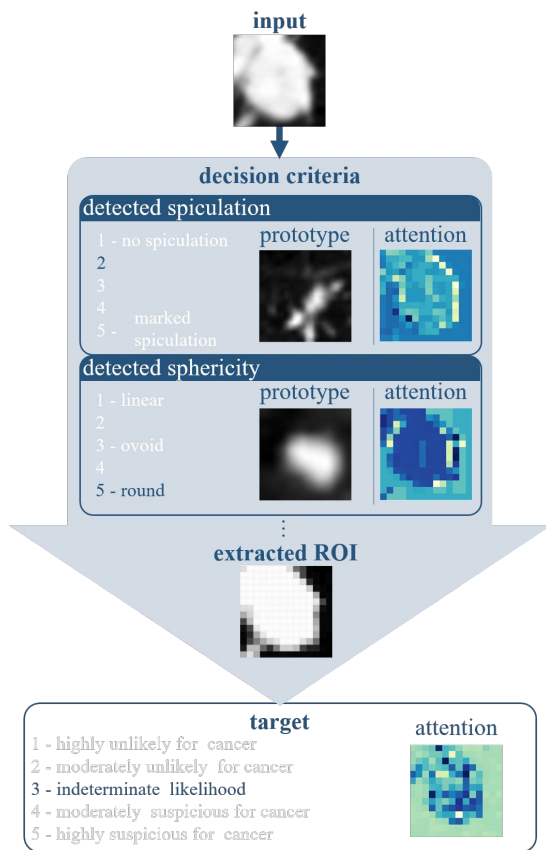


Which is the real image?



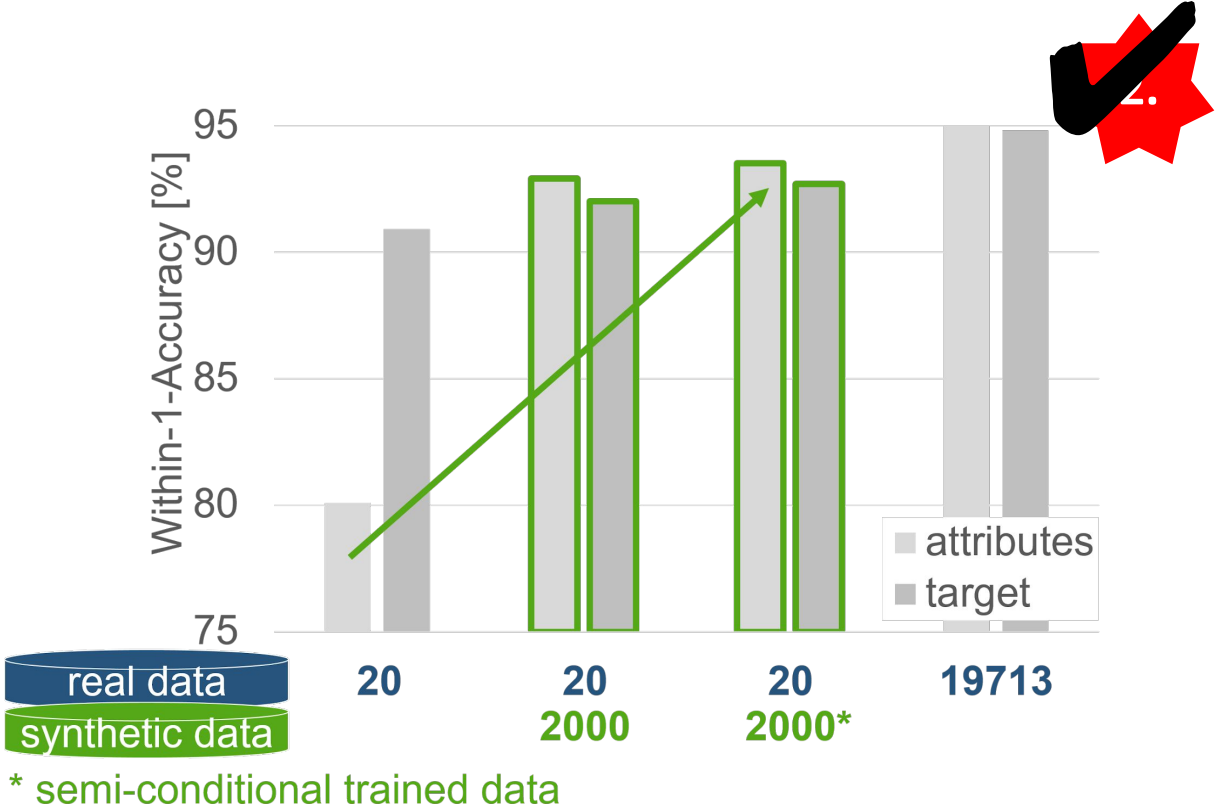
(a) 4 expert radiologists

xAI Model: HierViT

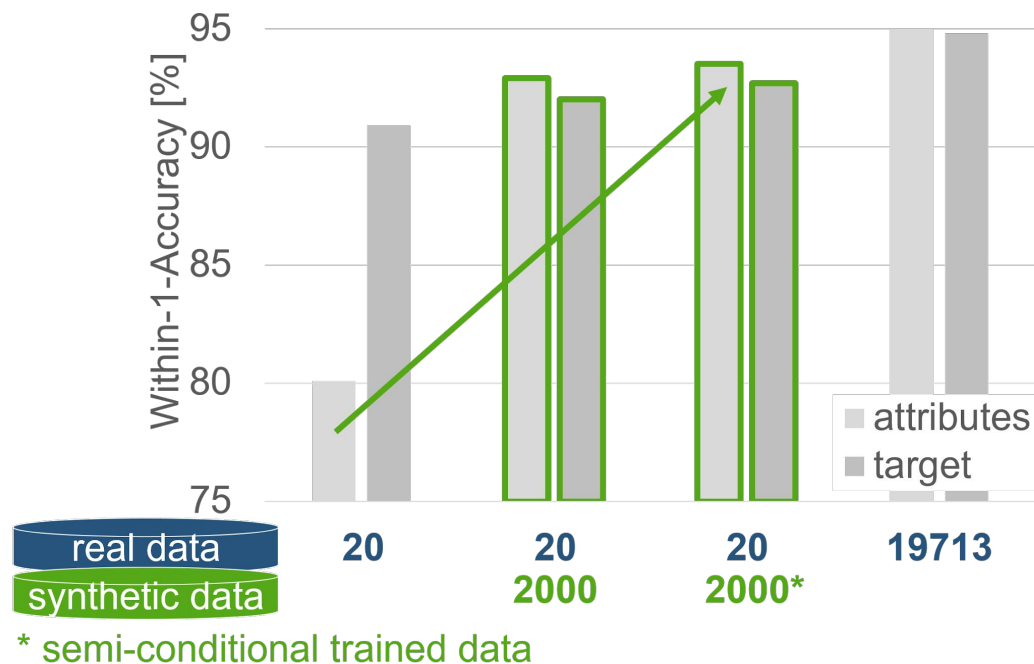


[1] Gallée, L. et.al. Hierarchical Vision Transformer with Prototypes for Interpretable Medical Image Classification

Using synthetic data in xAI training



Minimum Data, Maximum Impact: 20 annotated samples for explainable lung nodule classification



Luisa Gallée

Experimental Radiology, Ulm
University Medical Center, Ulm

