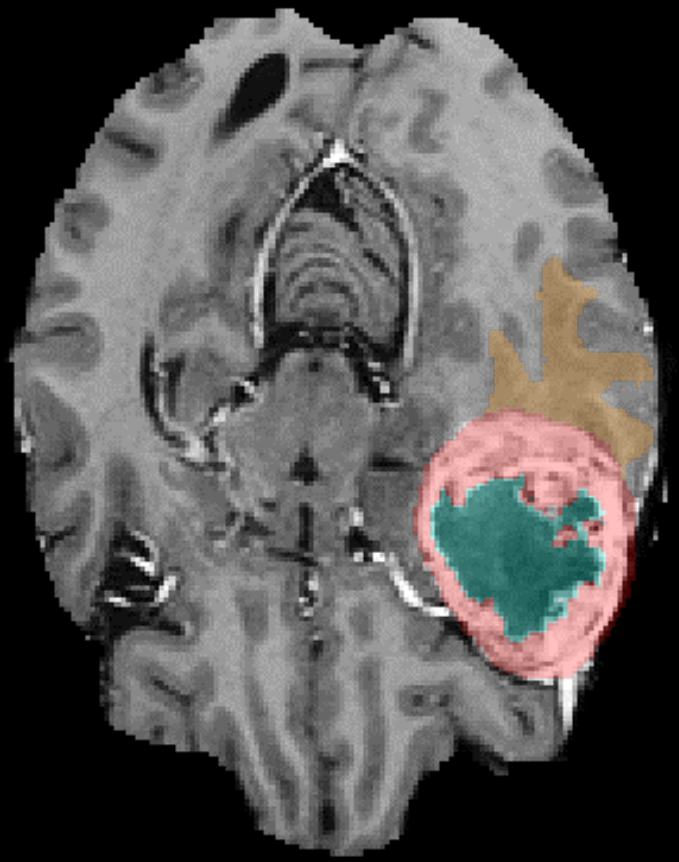
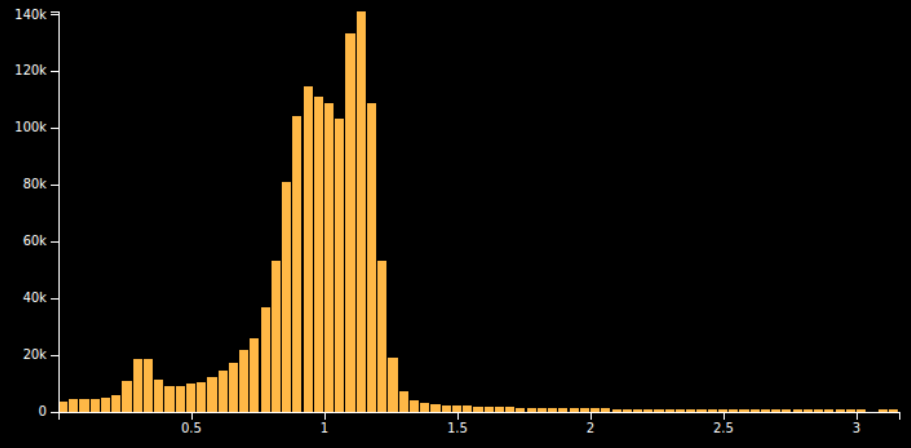
Efficient and Reliable Segmentation of Large Image Data

Jens Petersen
DKFZ Junior Group Medical Image Computing
16th November 2016

dkfz. GERMAN CANCER RESEARCH CENTER IN THE HELMHOLTZ ASSOCIATION
Research for a Life without Cancer





- ✓ Size
- ✓ Shape
- ✓ Location
- ✓ Descriptive Statistics

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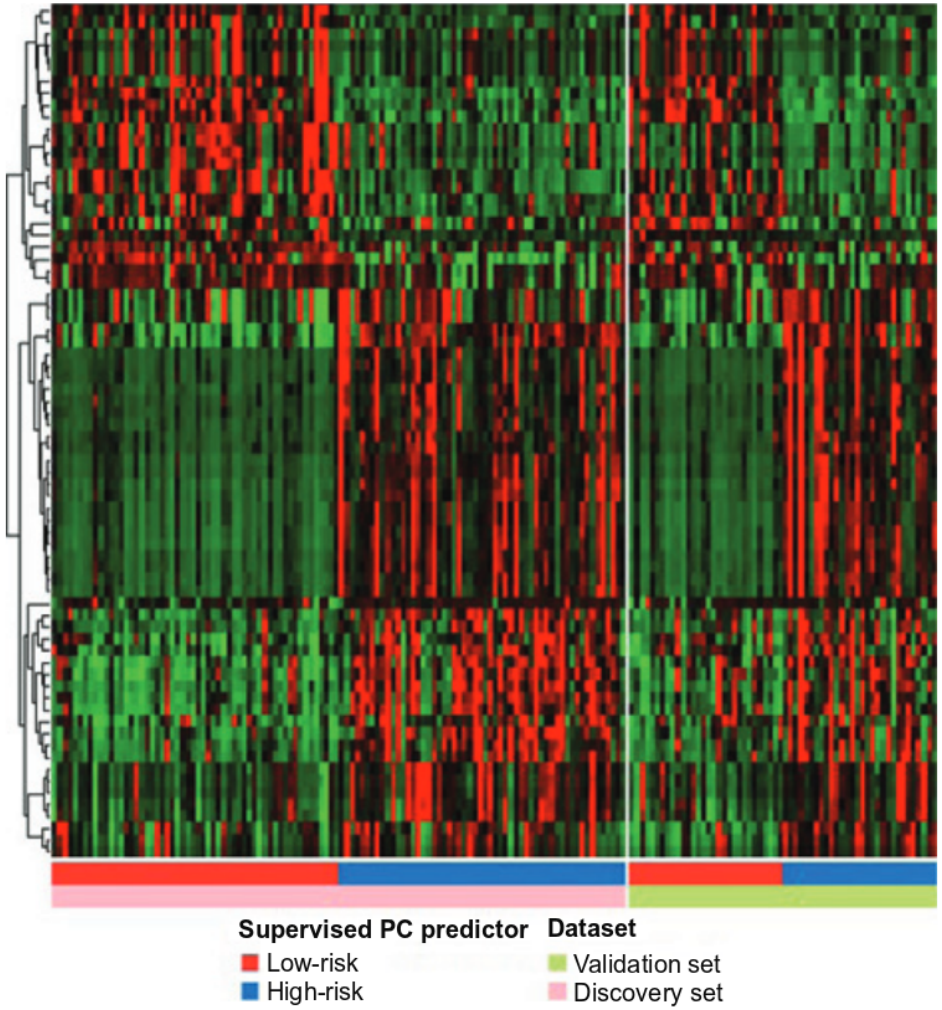
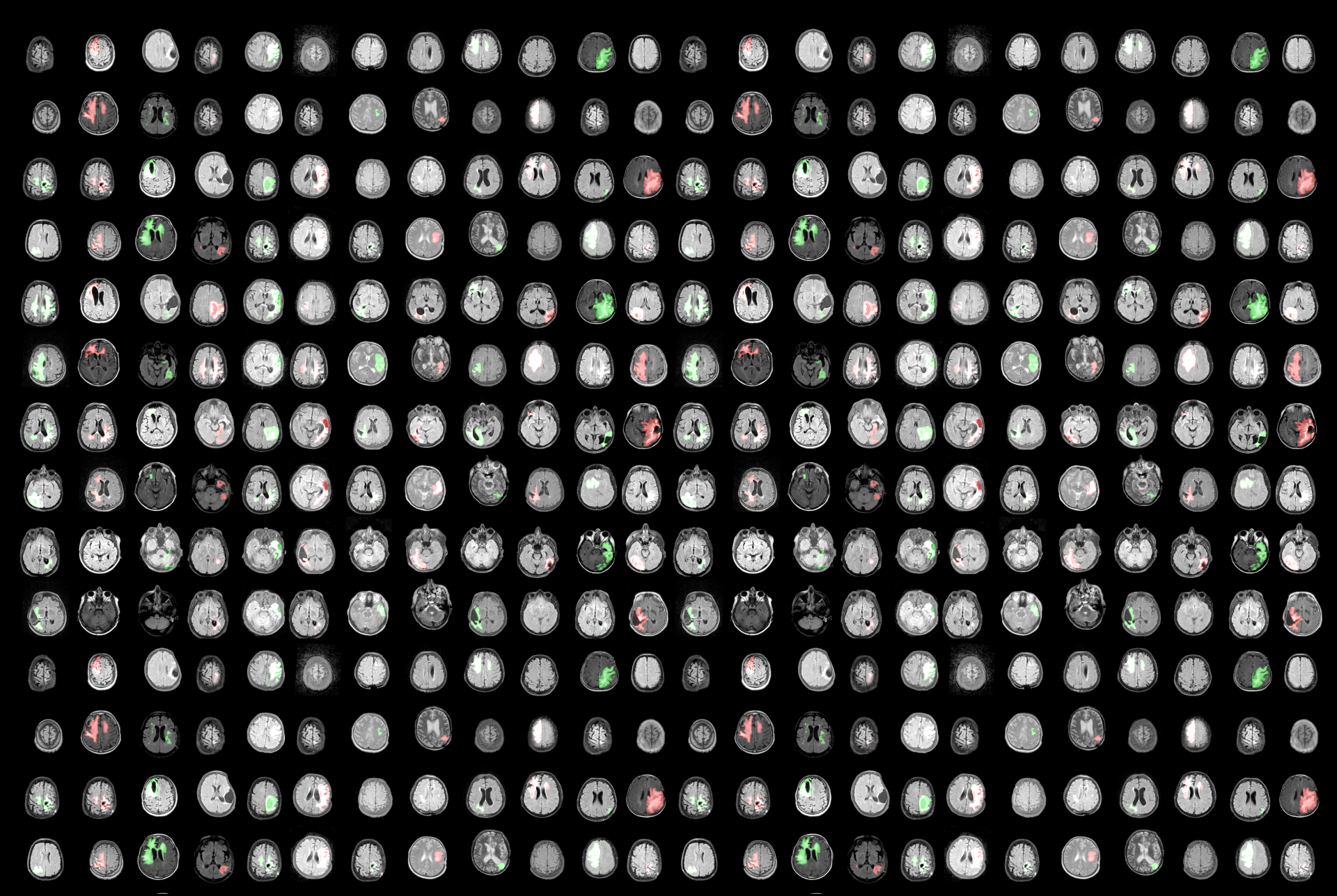


Kickingereder et al.: *Large-scale Radiomic Profiling of Recurrent Glioblastoma Identifies an Imaging Predictor for Stratifying Anti-Angiogenic Treatment Response*, Clinical Cancer Research, 2016 Oct. 10 [Epub ahead of print]



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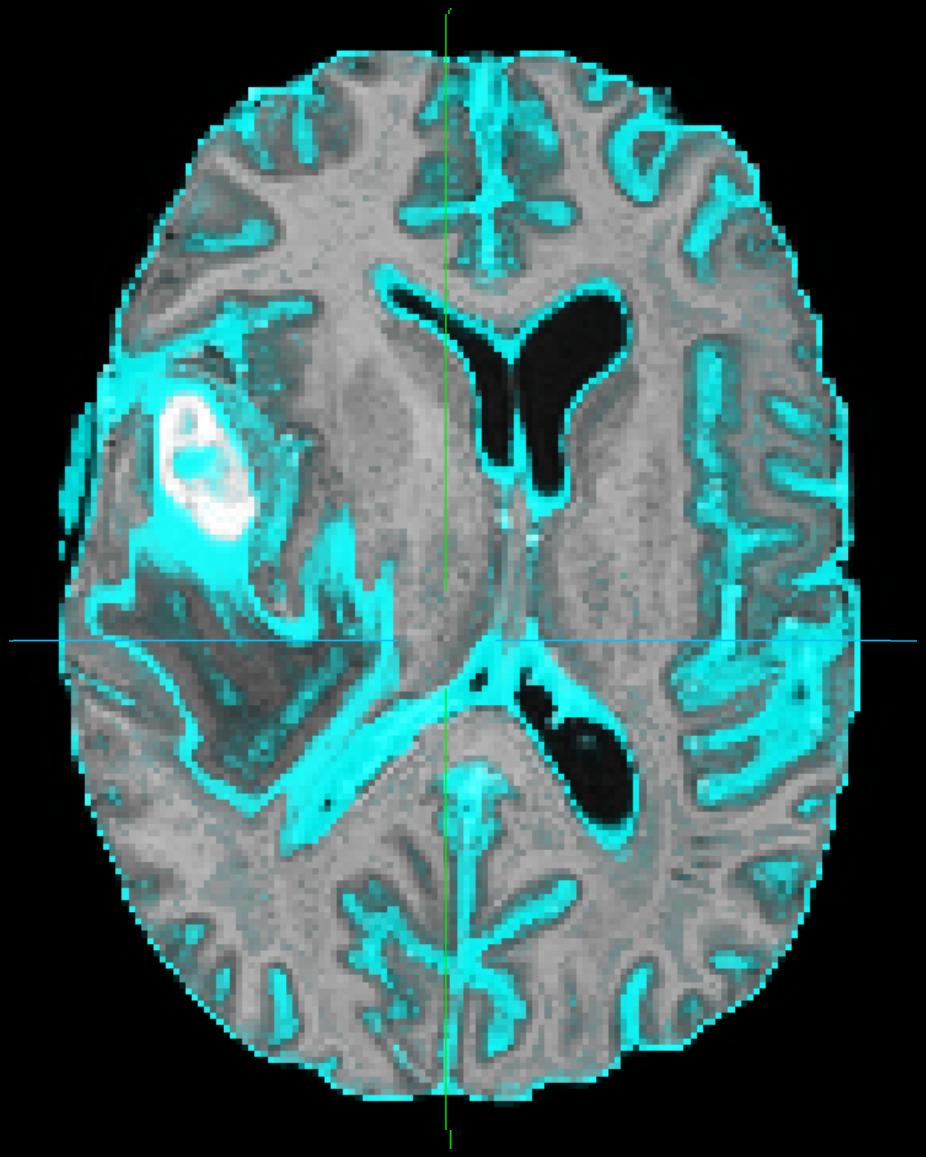
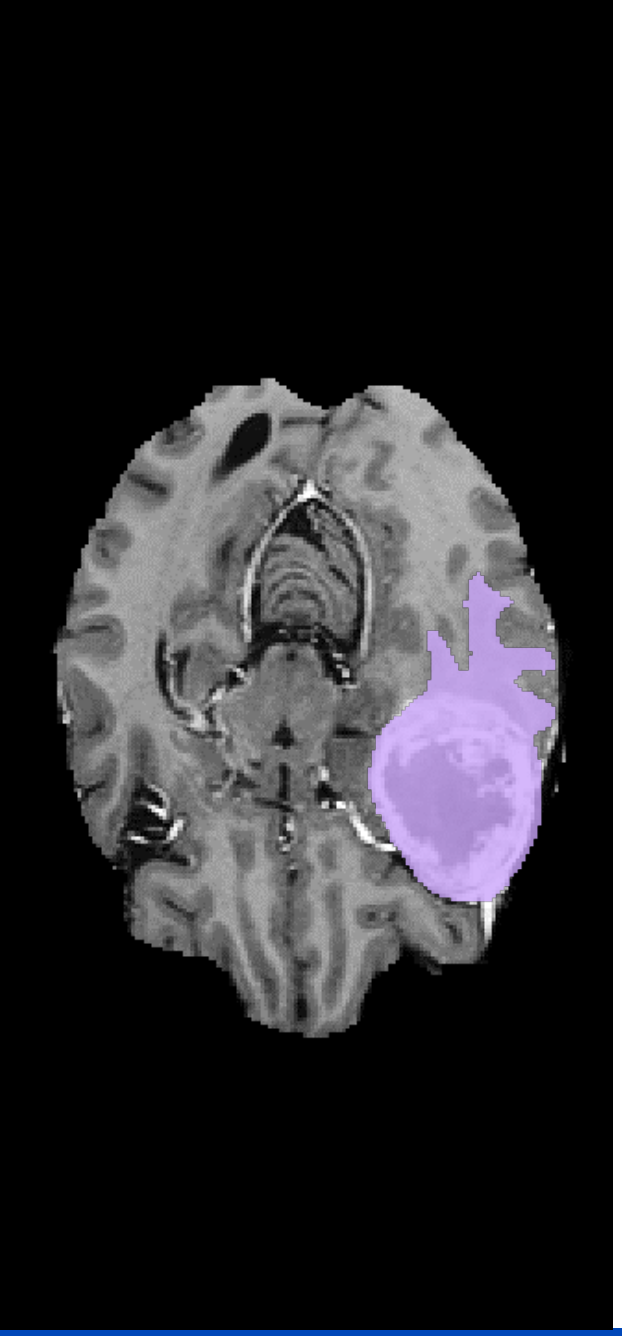
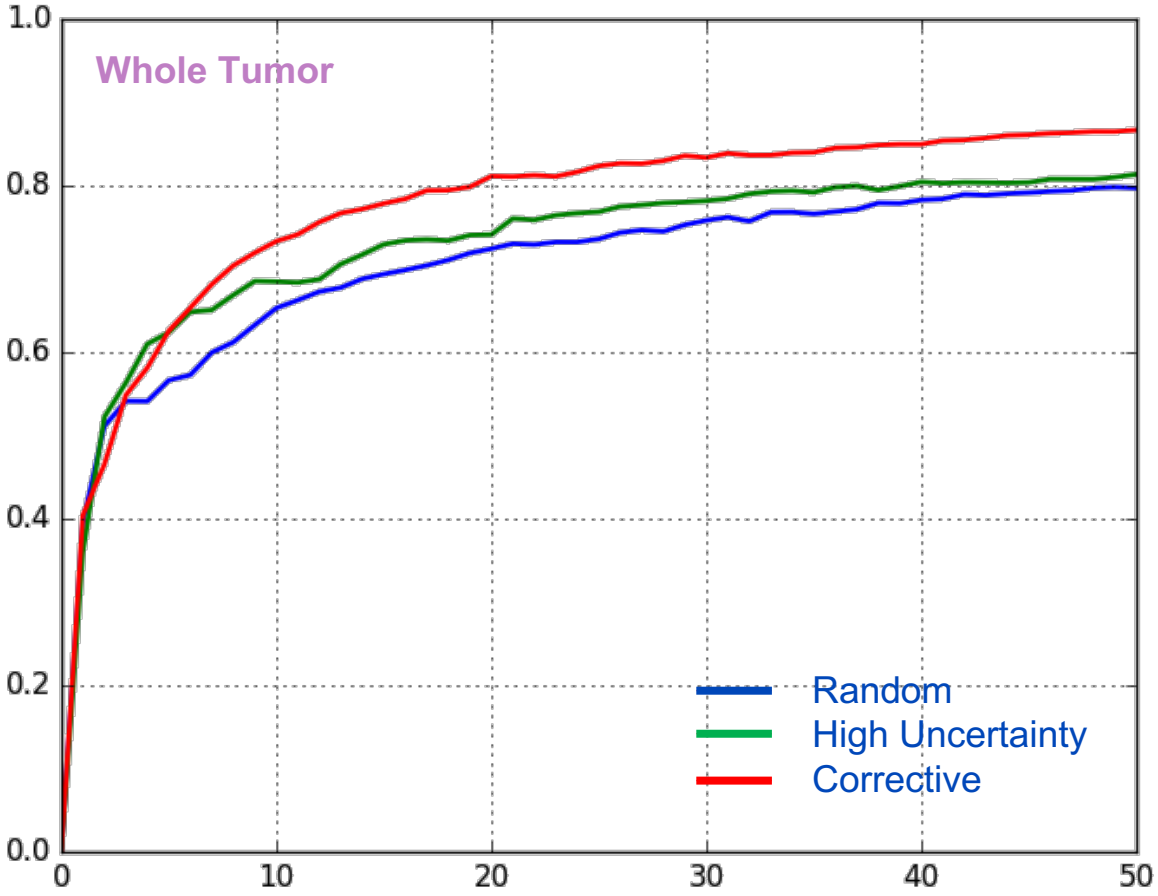
1. **Efficient Segmentation**
2. **Reliable Segmentation**
3. **…of Large Data**





Annotation Guidance



Petersen et al.: *Effective User Guidance in an Online Interactive Semantic Segmentation,* SPIE Medical Imaging 2017, accepted

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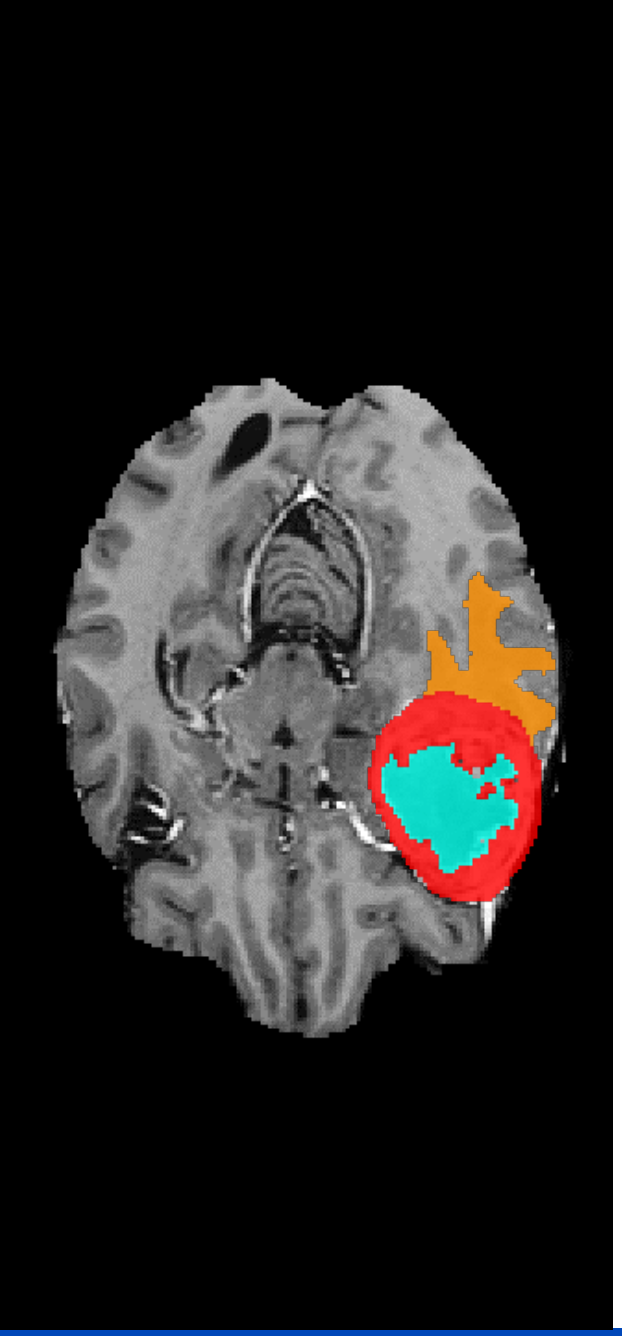

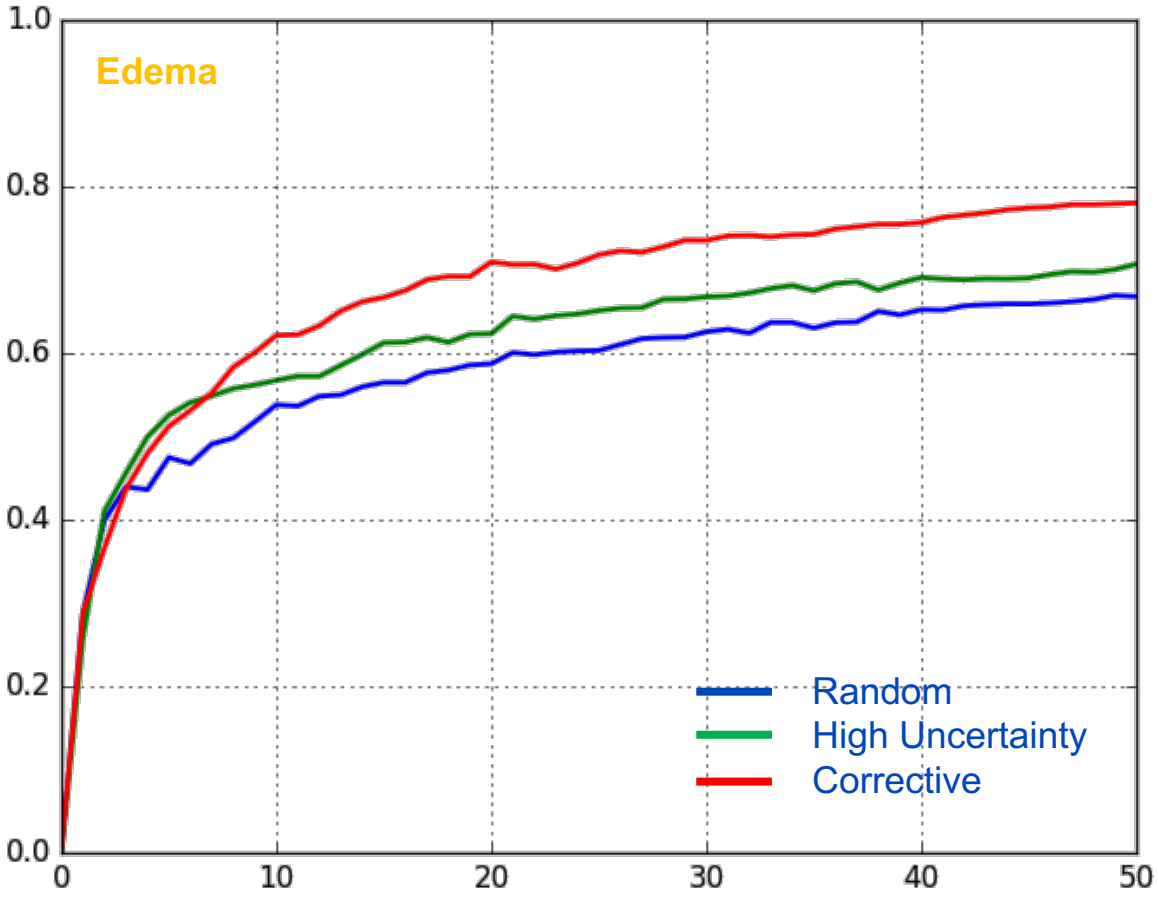

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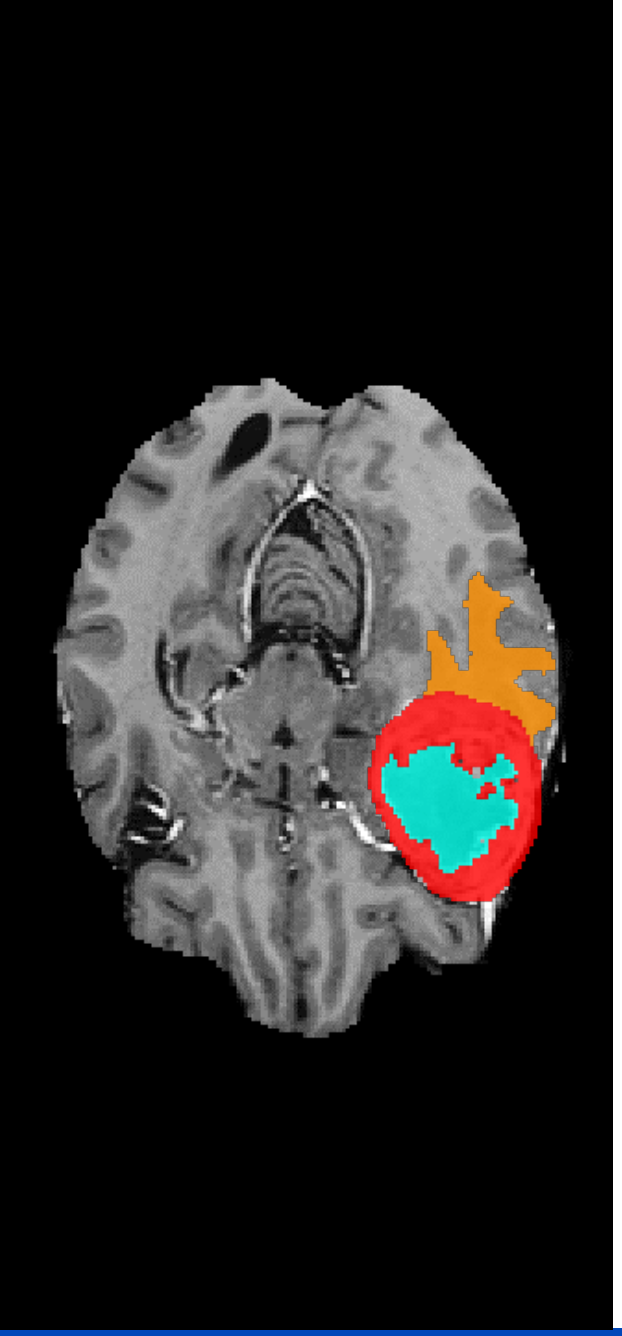

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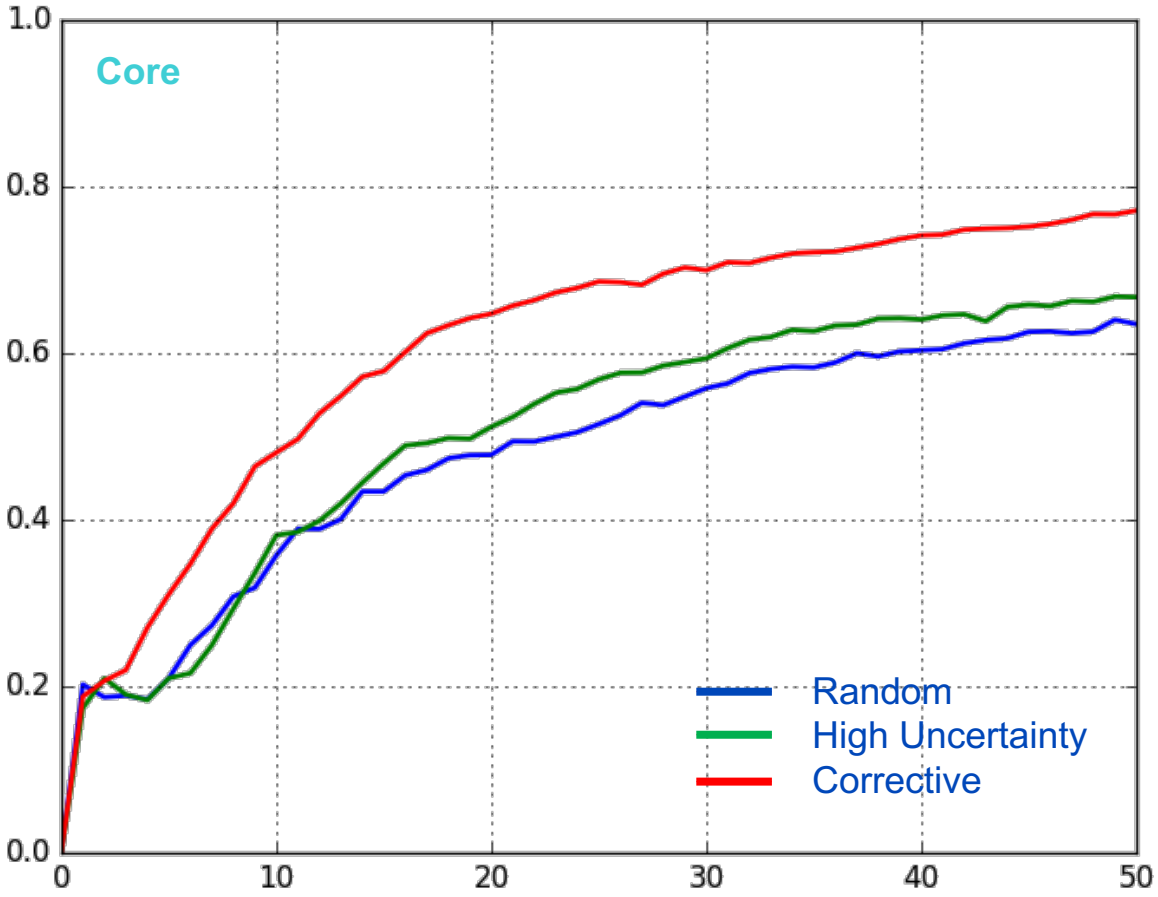

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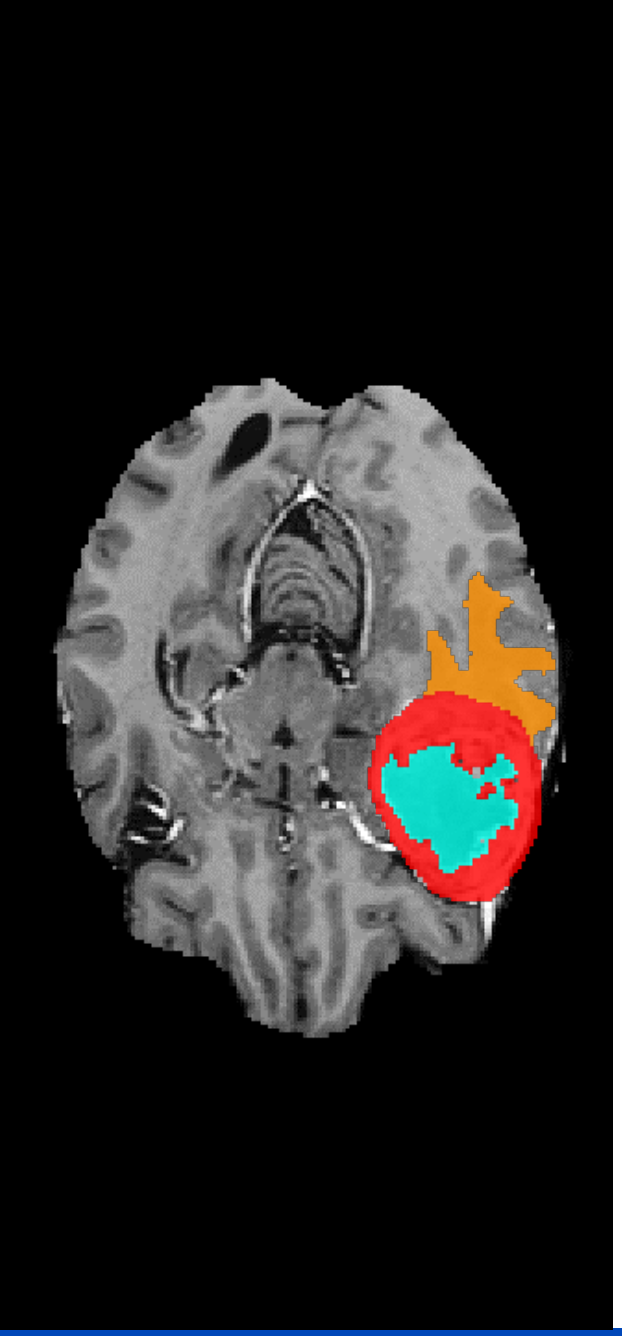

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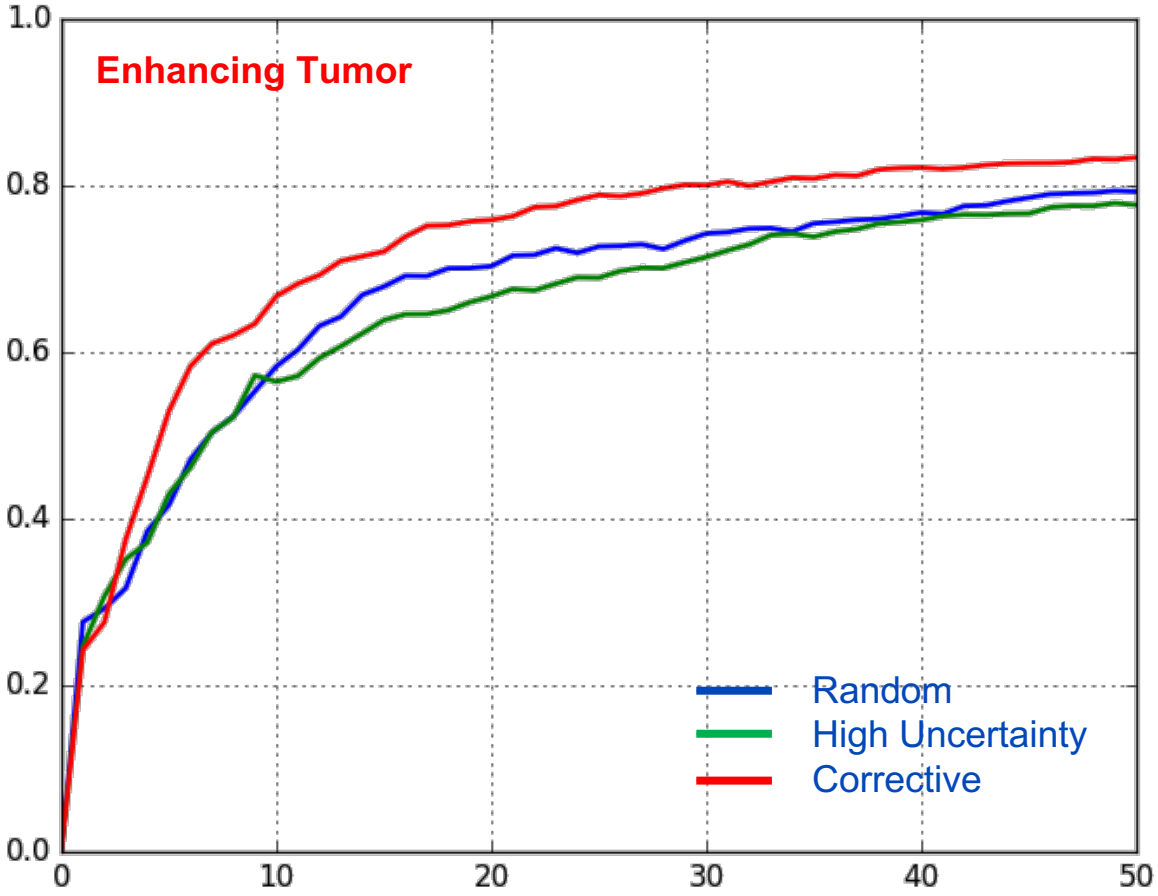

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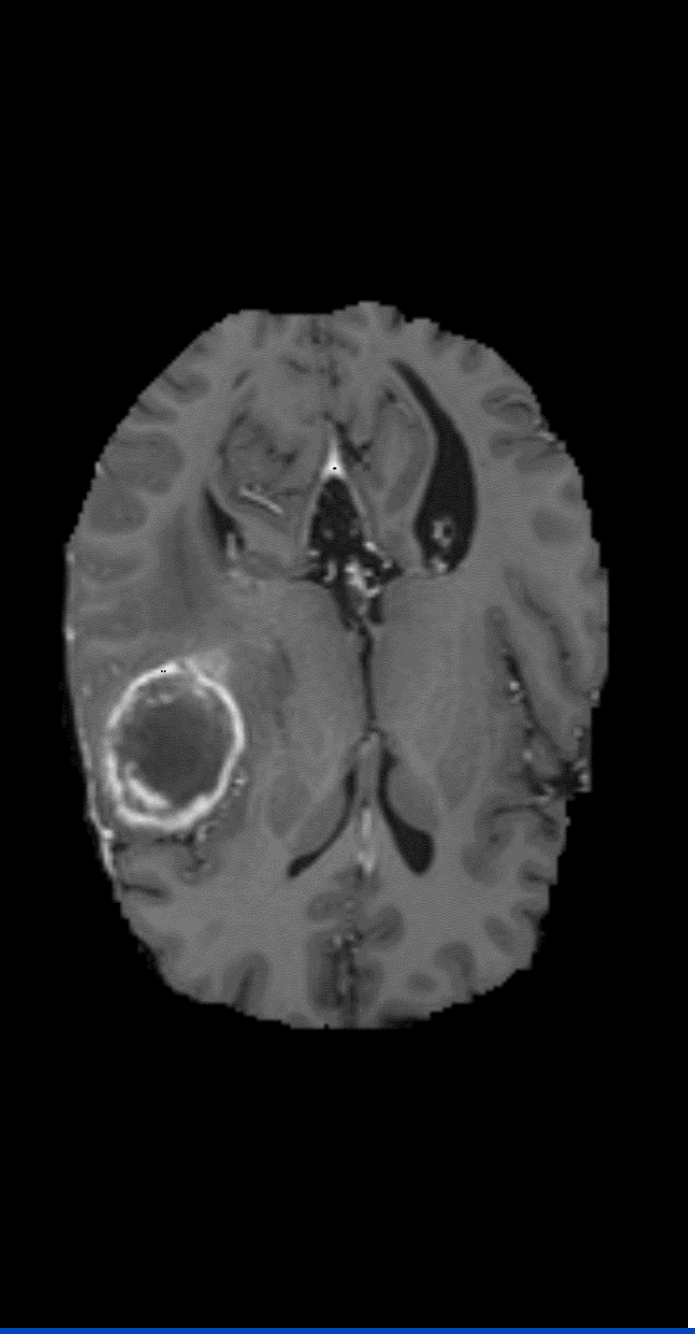
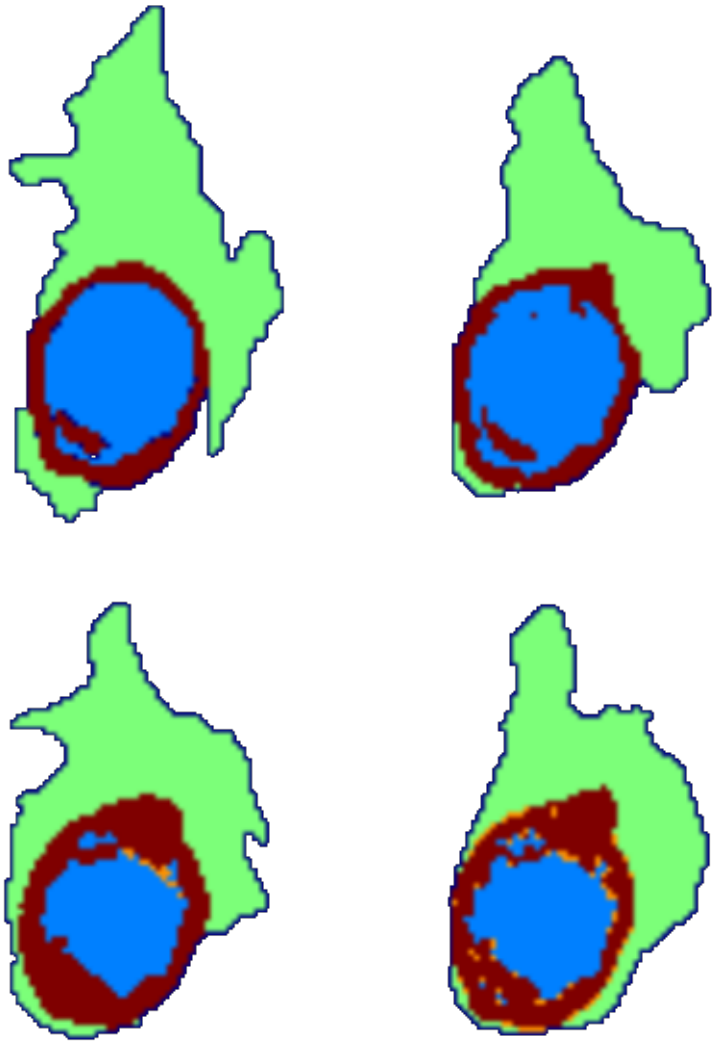
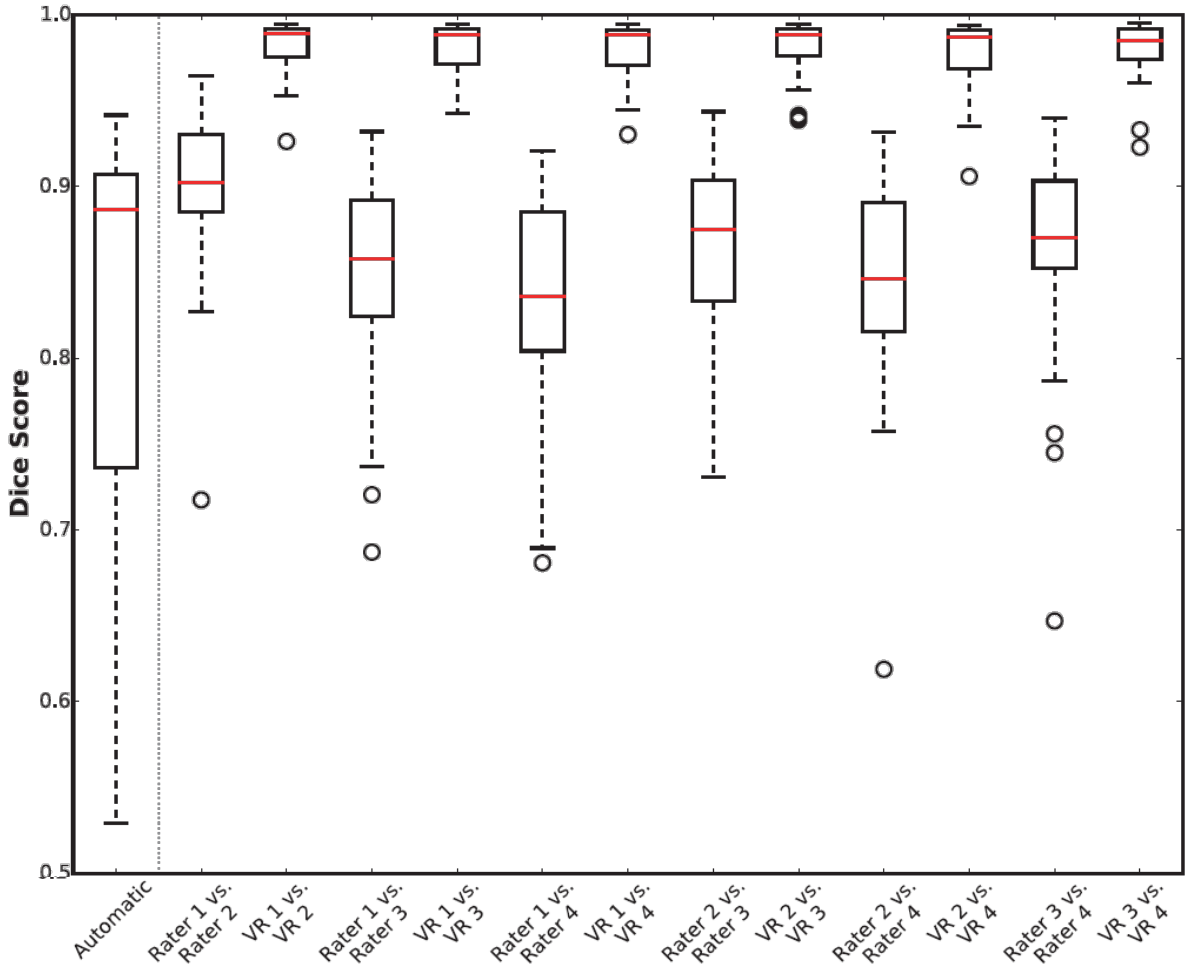
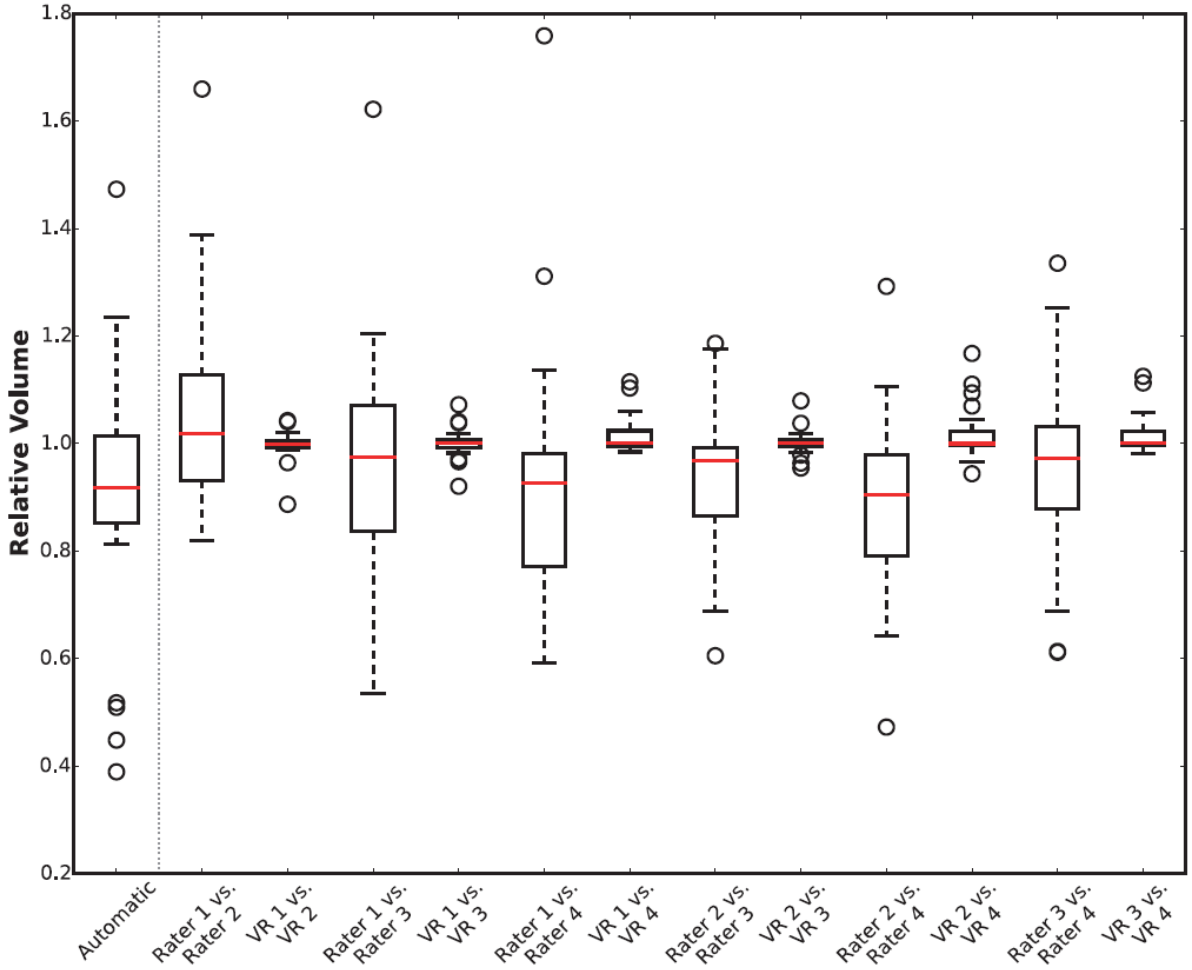






Kleesiek et al.: Virtual Raters for Reproducible and Objective Assessments in Radiology, Scientific Reports 6, 2016



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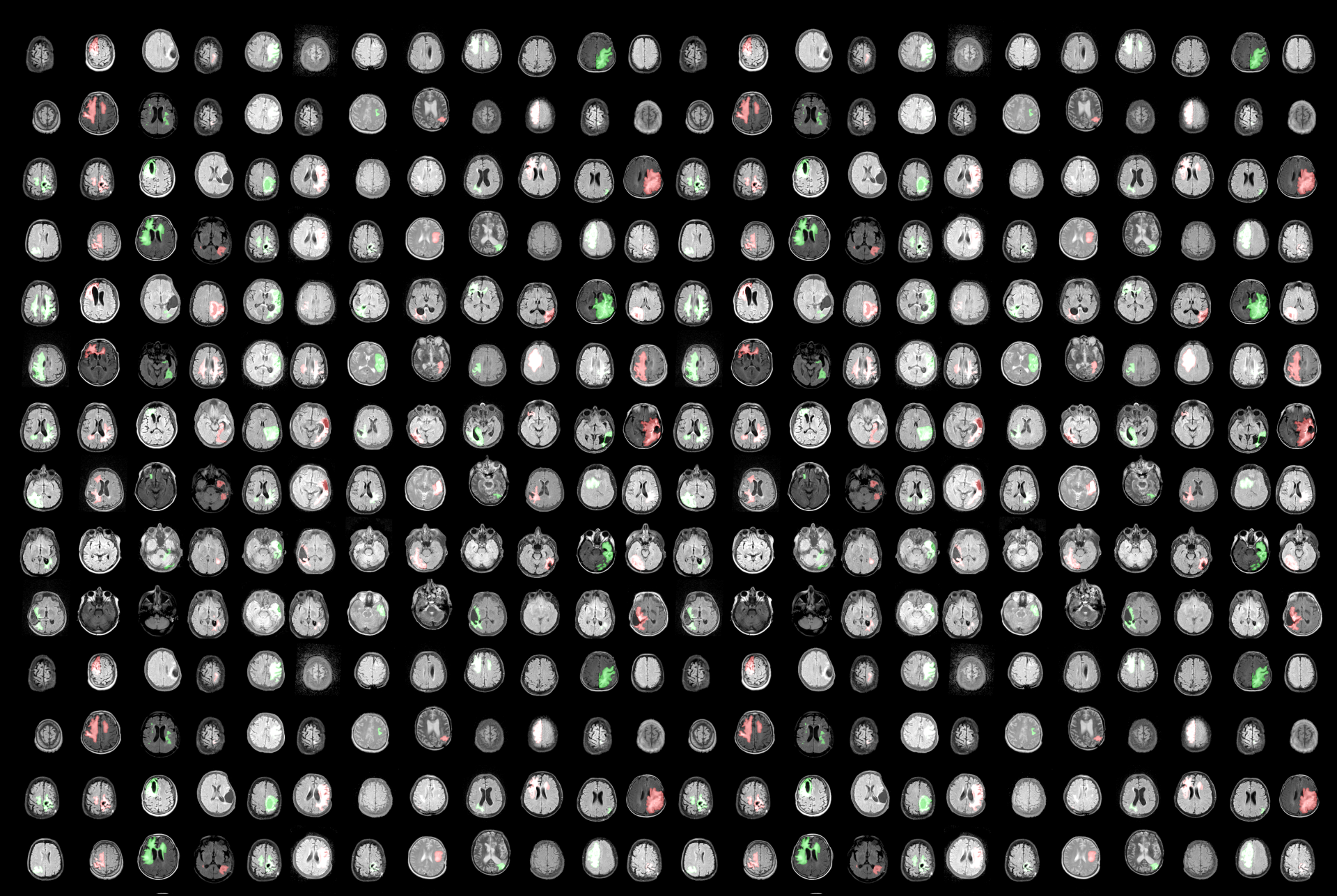

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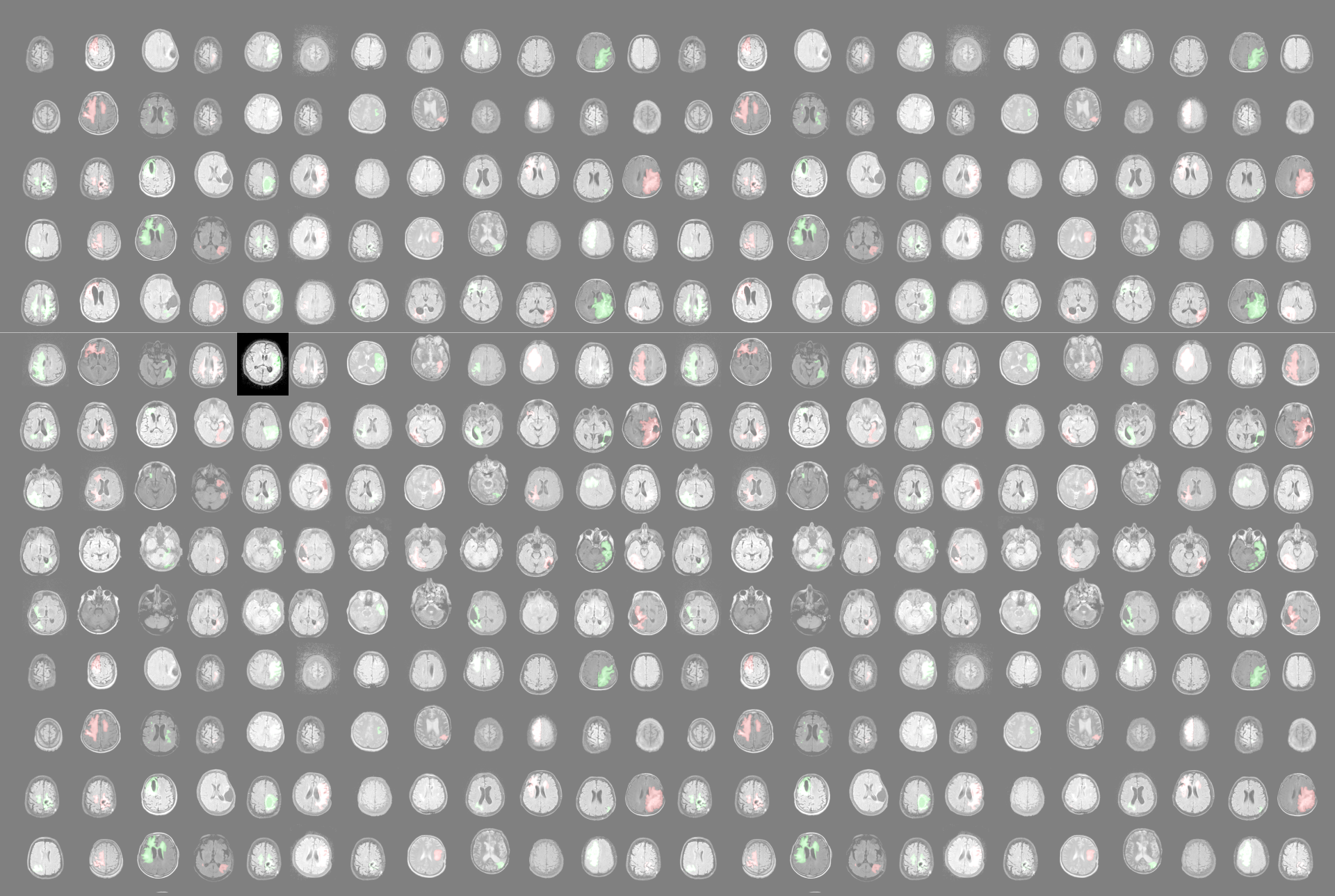

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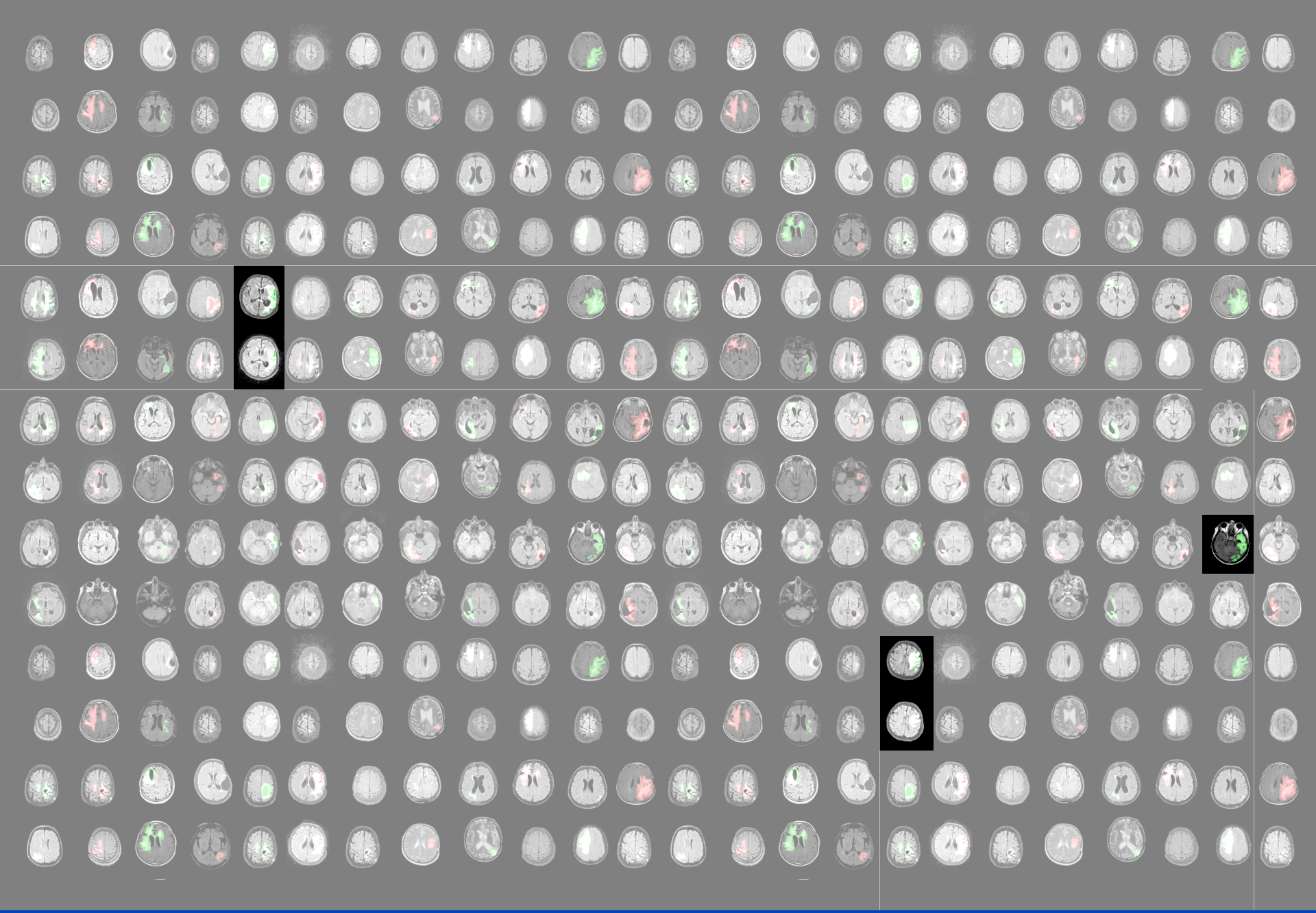

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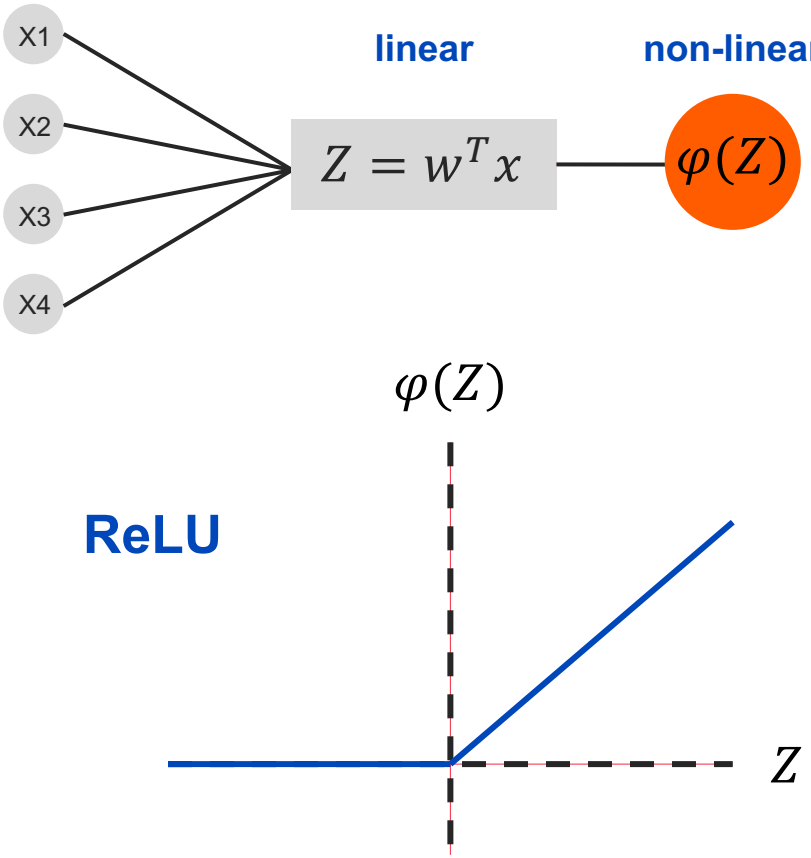
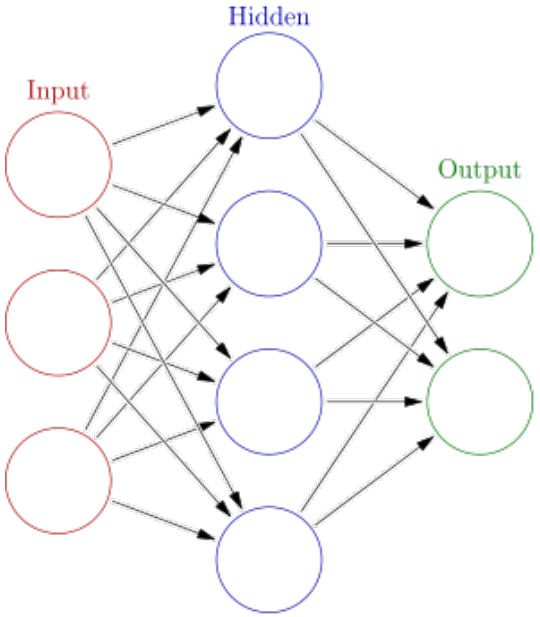
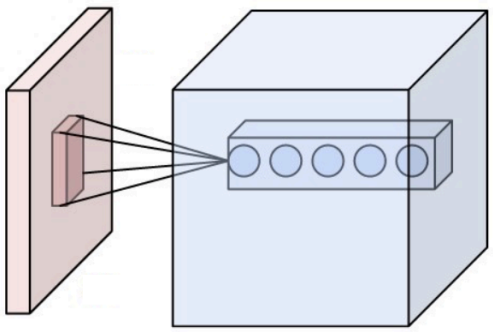
Artificial Neural Networks





Convolutional Neural Networks

1. Convolutional Layer

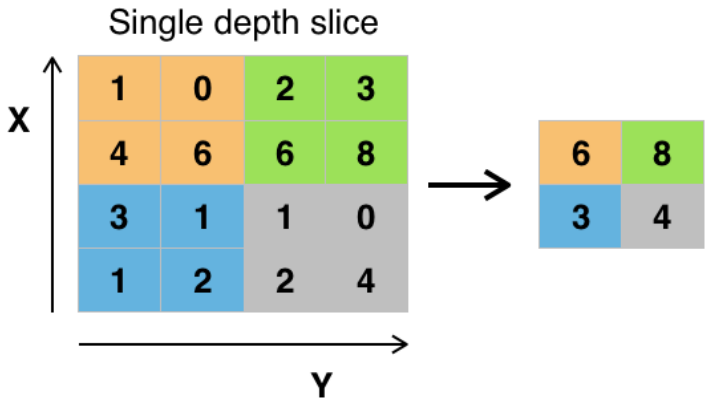


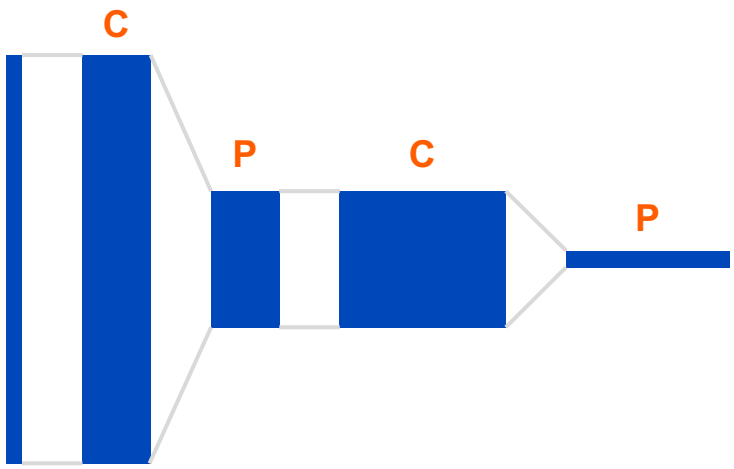
Receptive field

Weight sharing

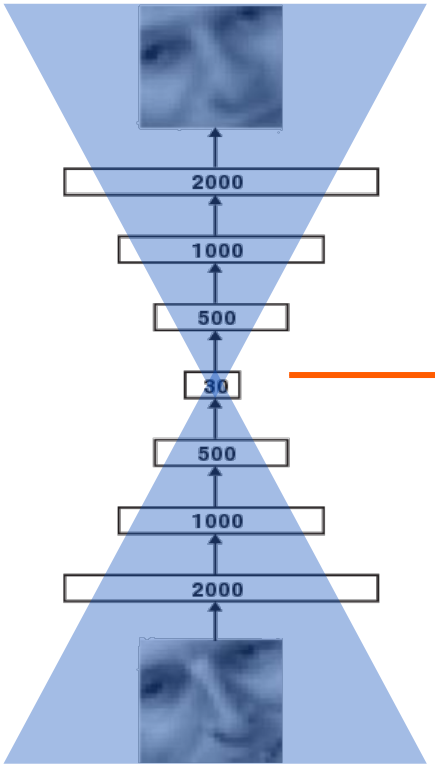
Multiple filters per layer

2. (Max-) Pooling Layer





Autoencoders



Reconstruction

2 Eyes, 1 Nose, 0.5 Mouth, Position

Hierarchical Information Compression

Shapes

Edges etc…

Pixels

Hinton, G. E. and Salakhutdinov, R. R.: *Reducing the Dimensionality of Data with Neural Networks,* Science 313, 2006

Thank you for your attention!

Further information on www.dkfz.de

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