

Brain Tumor Segmentation with Random Forest and U-Net

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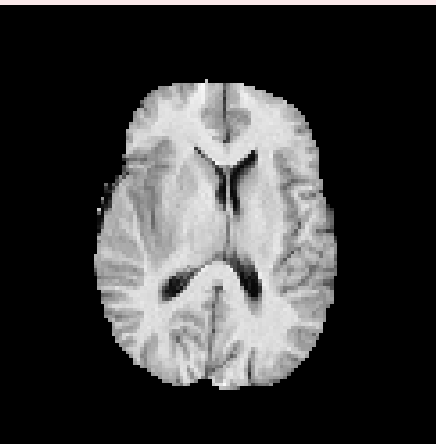
Heidelberg University

Motivation

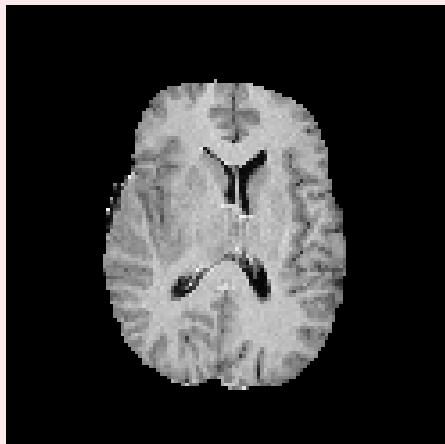
Dataset

3D MR scans of 275 human brains
4 scan types, T1, T1c, T2 and Flair
depth = 155, height = 240, width = 240
⇒ 170500 images
5 classes (we only use 2)
center-cropped to 80% of their size

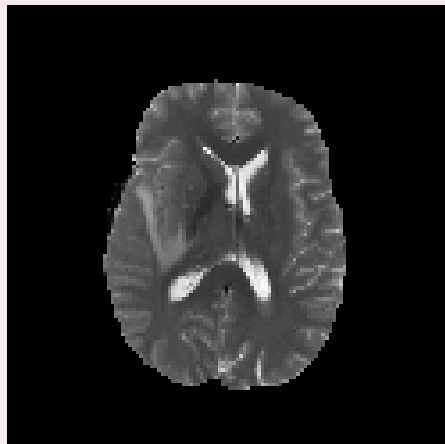
MR_T1



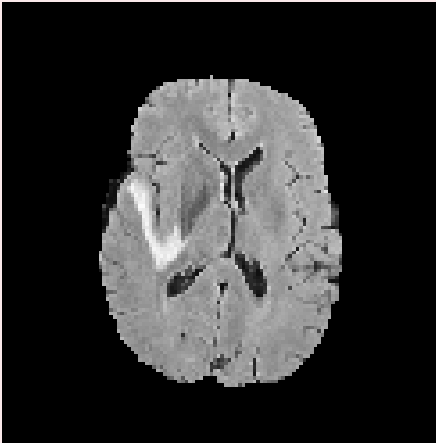
MR_T1c



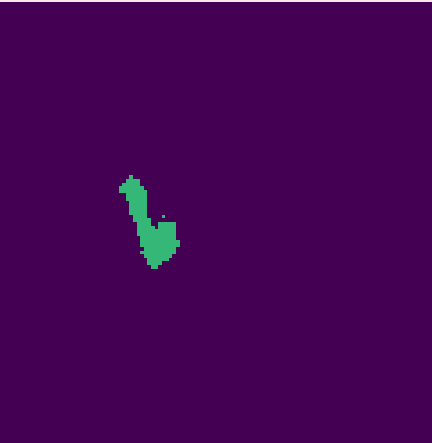
MR_T2



MR_Flair



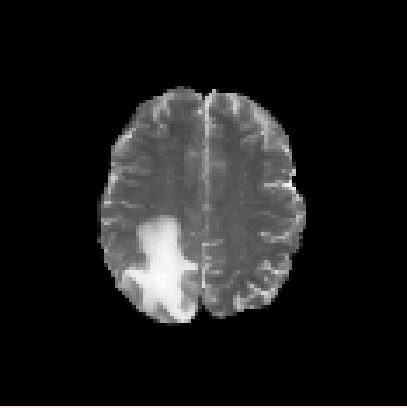
label




Features

Gaussian, LoG, Gaussian gradient
Hessian and structure tensor eigenvalues
equalized histogram
29 features in total
1k images + features ≈ 30 GB of memory


Gaussian




LoG



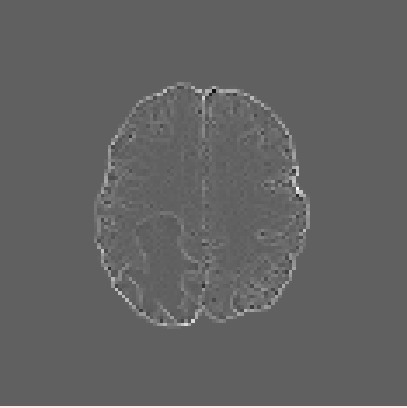
GradGauss



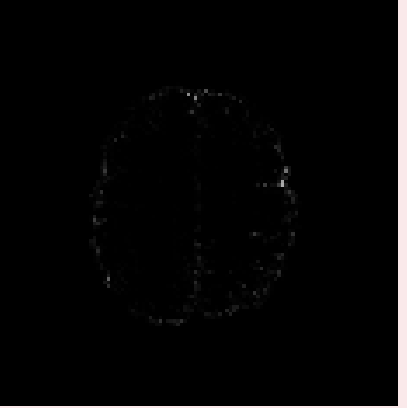
Hessian EV 1



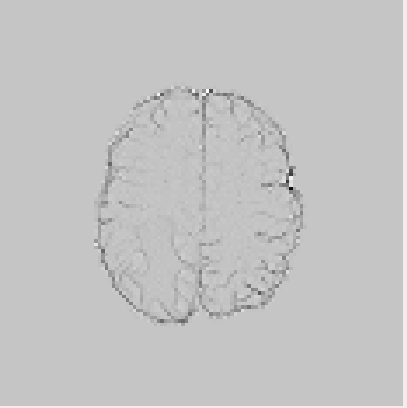
Hessian EV 2




S-tensor EV 1



S-tensor EV 2



Eq. histogram



Random Forest

trained in batch-mode [1]
100 estimators per batch, 3 batches of 1k images
after training ≈ 15 GB disk space (pickled)
inference time ???, load time ???

RF: Example

Important Result

Mathematical Section

Methods

Results

Conclusion

Additional Information

References

[1] M. Ristin, M. Guillaumin, J. Gall, and L. Van Gool.
Incremental learning of random forests for large-scale image
classification.
*IEEE Transactions on Pattern Analysis and Machine
Intelligence*, 38(3):490–503, March 2016.

Acknowledgements



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