

Retina U-Net for Aneurysm Detection in MR Images

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ADAM 2020

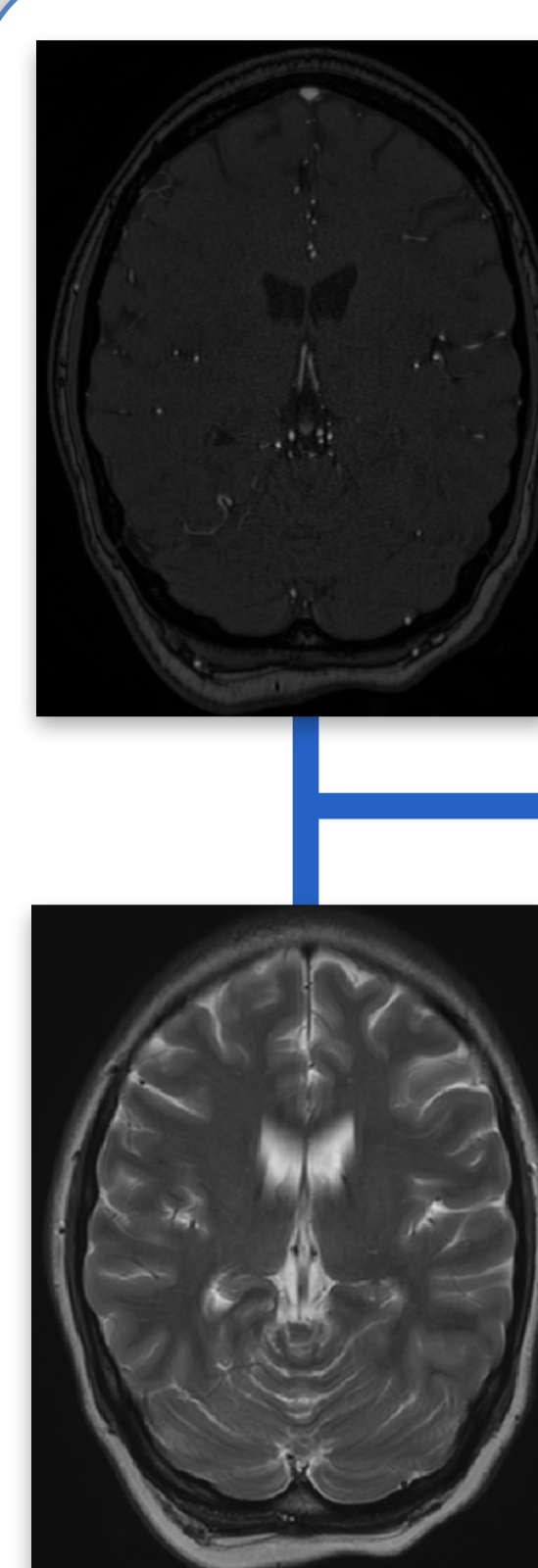
Data

- 113 scans with 20 scans without diagnosed intracranial aneurysm
- 156 instances
- 124 Untreated, unruptured aneurysm (class 1)
- 32 Treated aneurysms or artefacts resulting from treated aneurysms (class 2)

Goal

- Predict center of untreated aneurysms

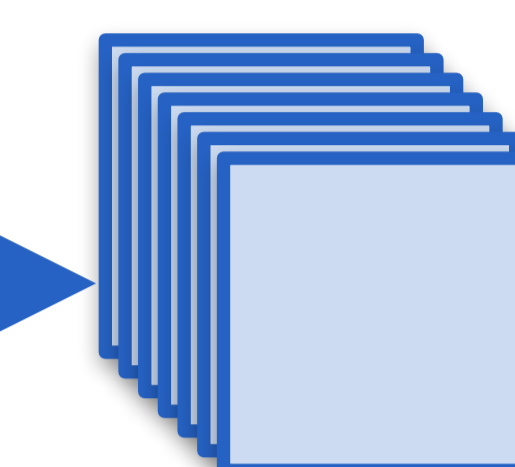
Preprocessing



Intensity Normalisation
Zero Mean and Unit Standard Deviation

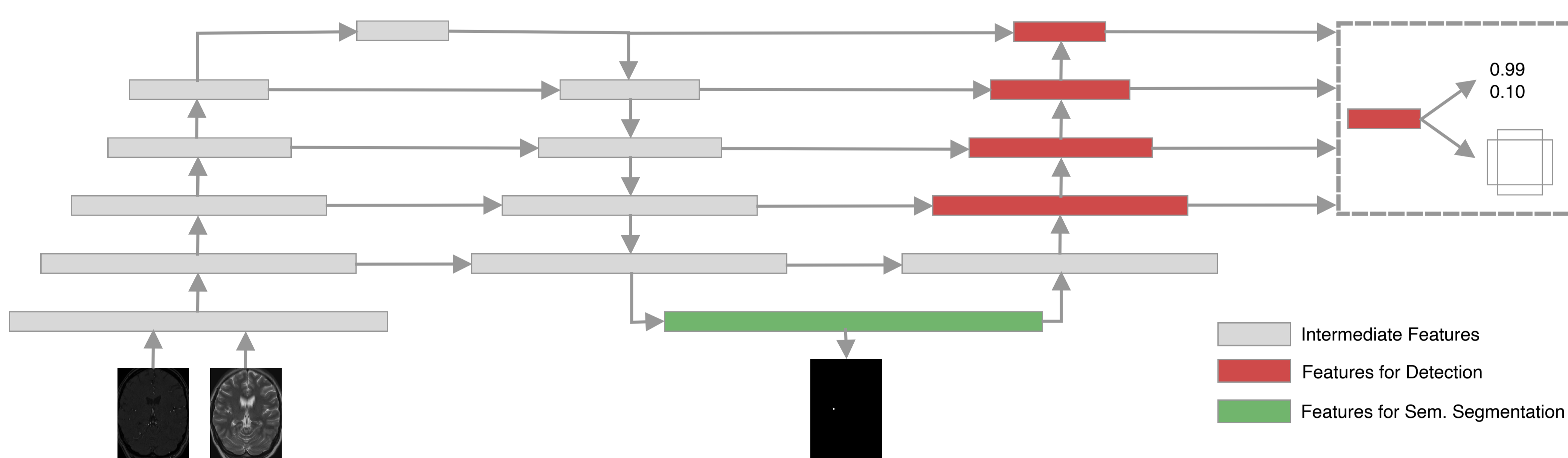
Resampling
0.357 x 0.357 x 0.5 mm

Patch based training and inference



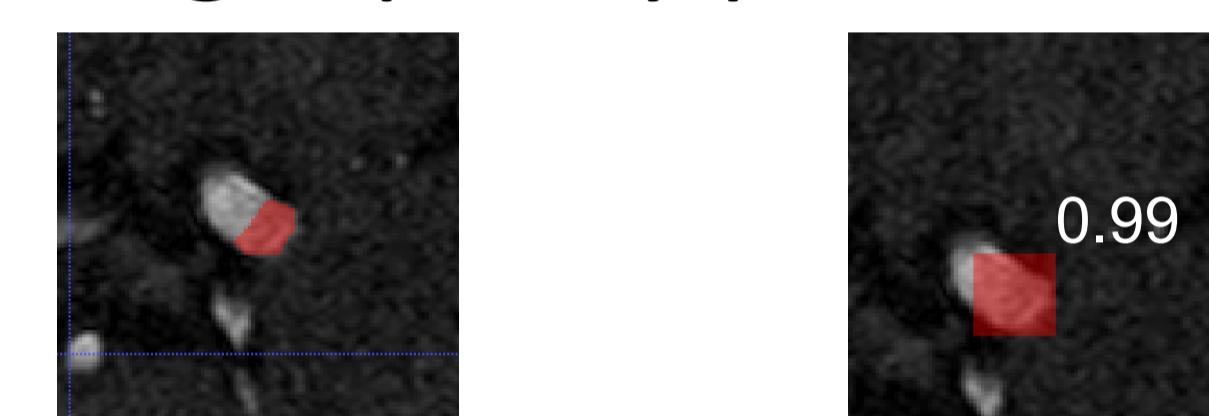
- Bias field corrected and aligned structural image
- Bias field corrected TOF MRA image
- Training and inference use patches with 224x224x56 Voxels

Retina U-Net + Path Aggregation Network



Qualitative Results

High quality prediction

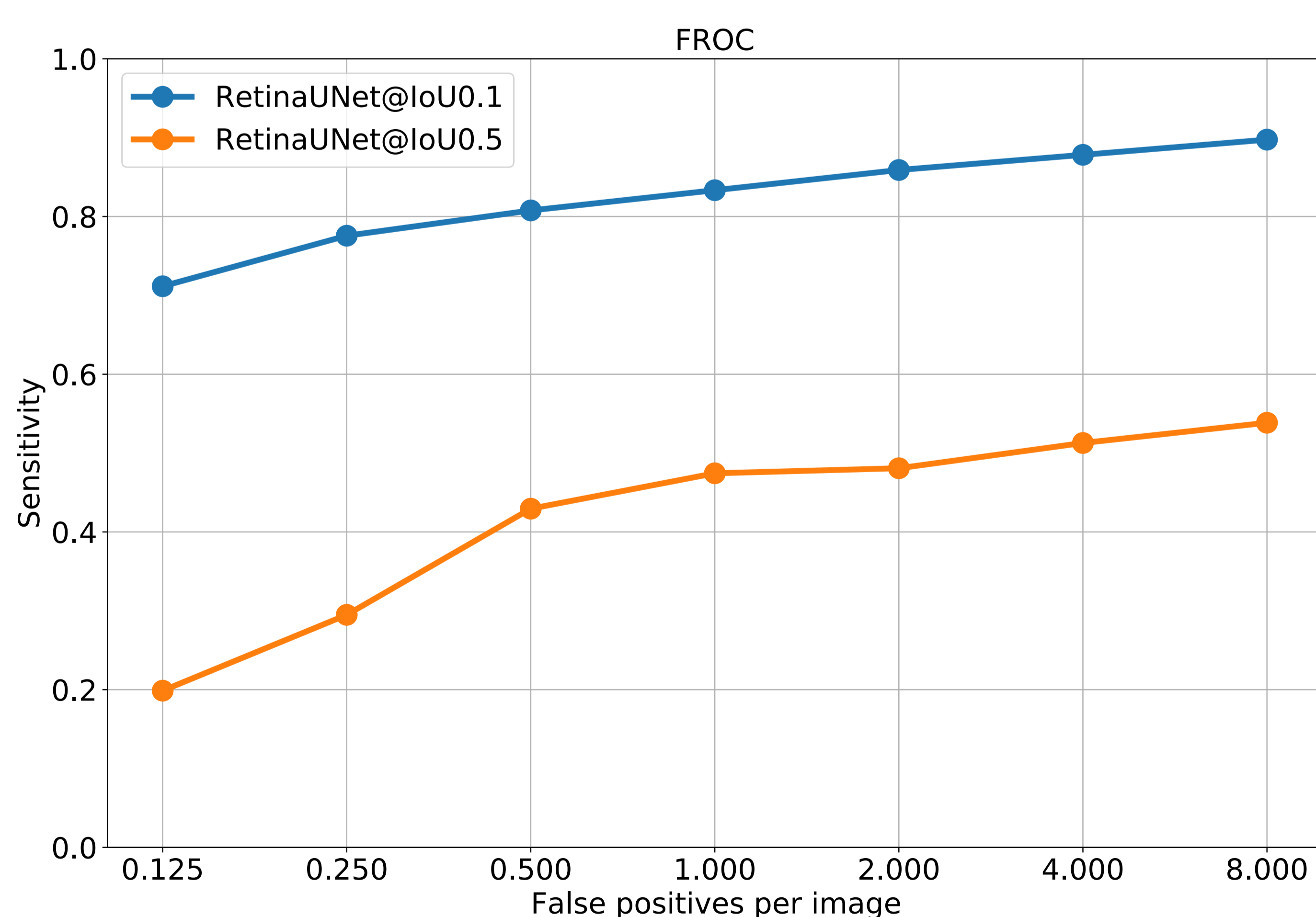


Coarse localisation of small aneurysms



5 Fold Cross Validation Results

IoU / Metric	Box FROC	Box AP
0.10	0.823	0.801
0.50	0.418	0.336



Final performance is mainly limited by accurate bounding box regression.

Please Note: These results are too positive because the splits do not consider patients with follow up.

Prevalent Challenges

- Use center of bounding box to determine final center point
- Choose probability threshold which balances sensitivity and number of false positive per scan

Team: mibaumgartner

Task 1 Rank: 0.03 **Task 1 Place: 1 st**

(lower rank is better)

Task 1	False Positives	Sensitivity
Average	0.14	0.66
Rank	0.01	0.05

Selected Publications

Jaeger et. al. *Retina U-Net: Embarrassingly Simple Exploitation of Segmentation Supervision for Medical Object Detection* ML4H NeurIPS19
Liu et. al. *Path Aggregation Networks for Instance Segmentation* CVPR18
Lin et. al. *Feature Pyramid Networks for Object Detection* CVPR17