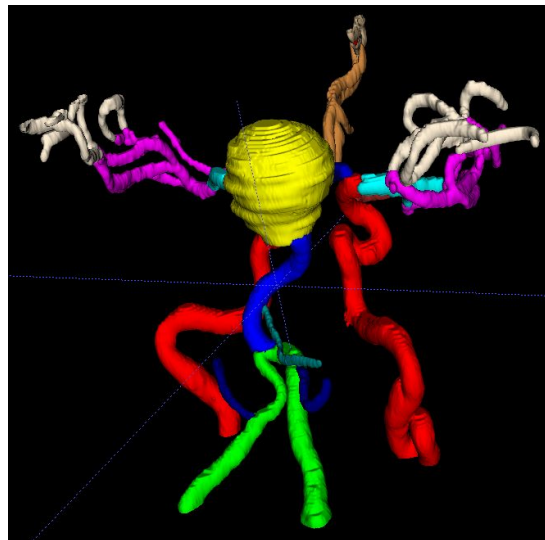
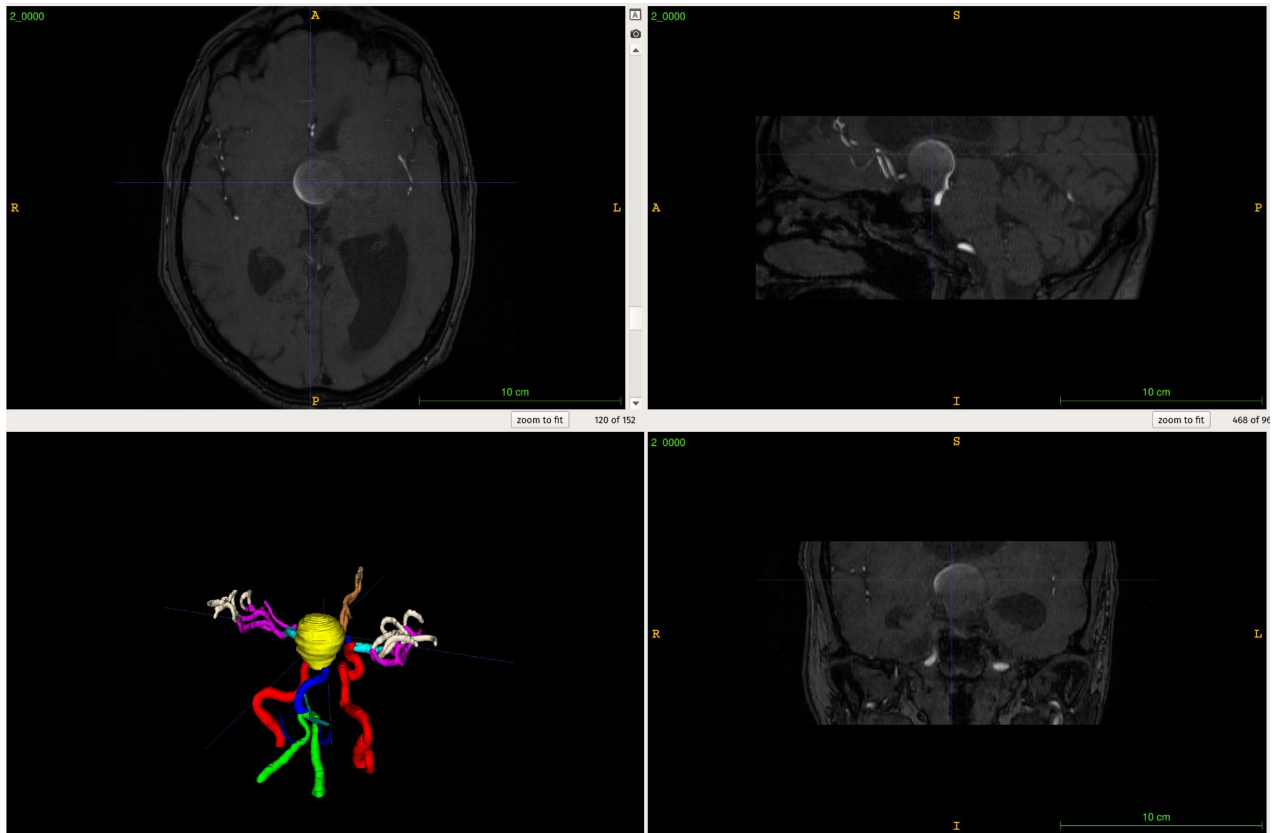


USZ Dataset

- 63 TOF-MRA scans
- Segmentations of:
 - 20 types of intracranial arteries (ICAs)
 - Aneurysms
- The median aneurysm volume to total volume ratio is of $\sim 4e-5$

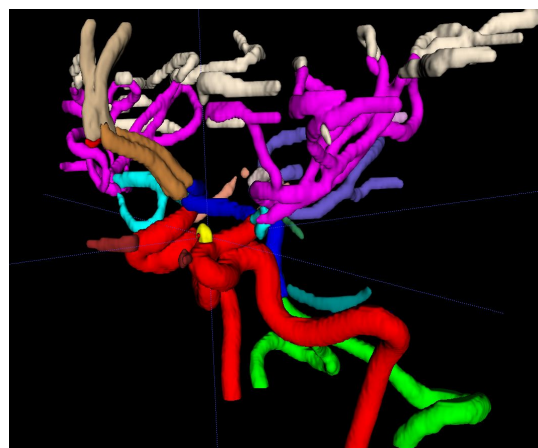
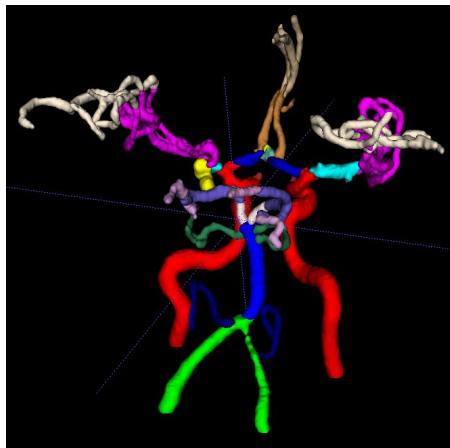
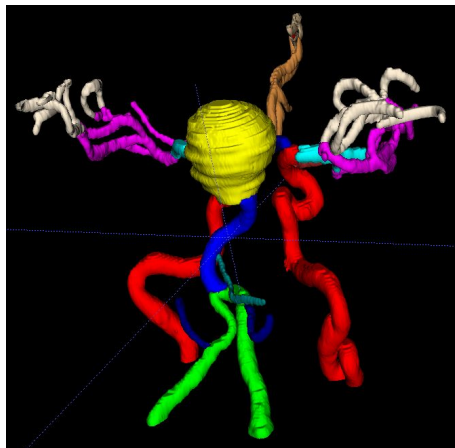


USZ Dataset

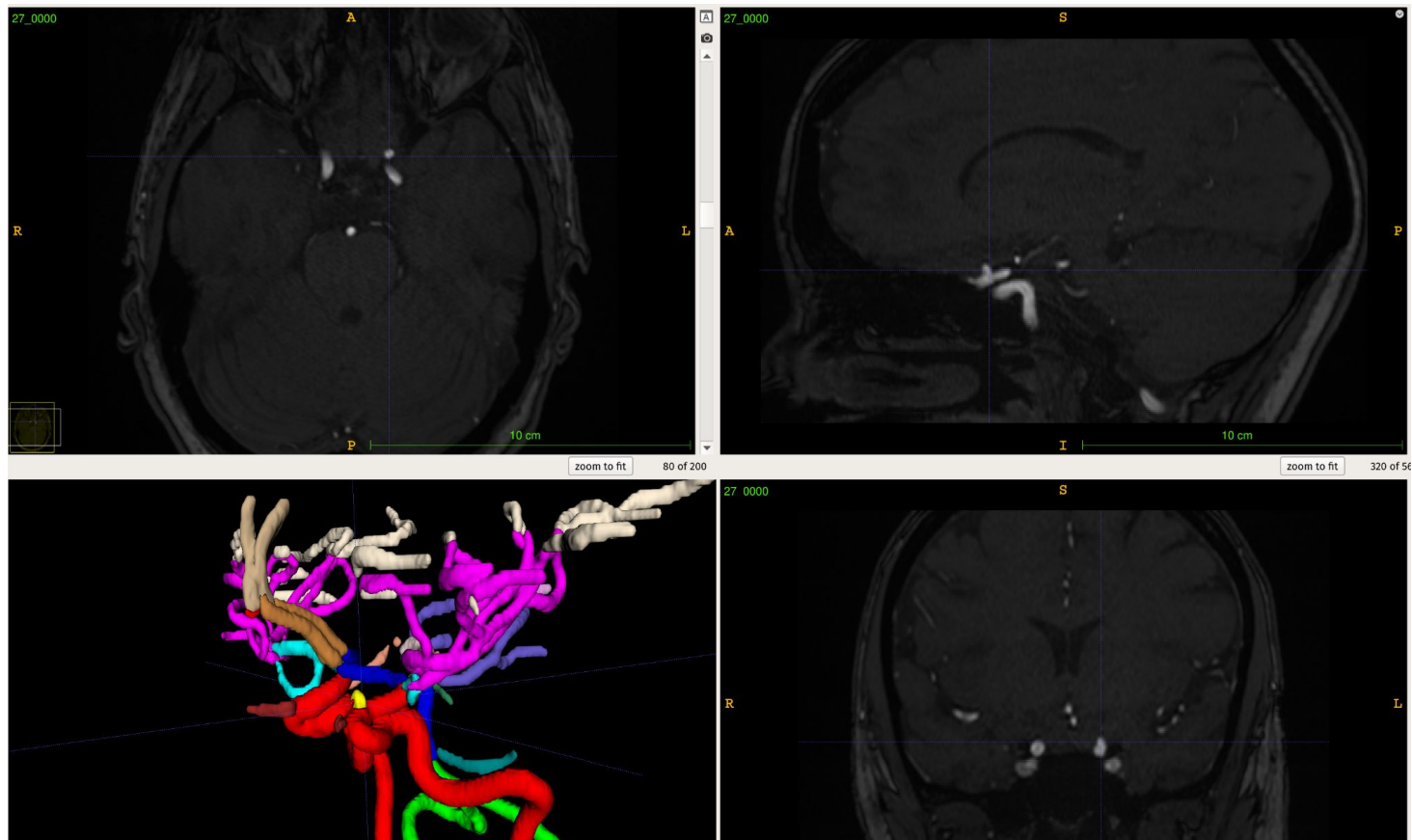


USZ Dataset

Aneurysms (yellow) can vary largely in size and shapes

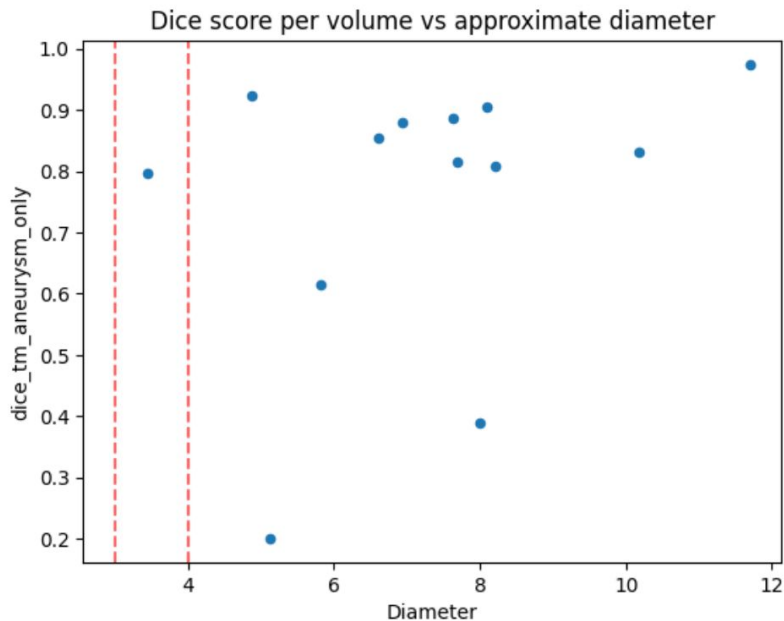


USZ Dataset



Current baseline USZ dataset

- With nnUnet, we have a dice score on aneurysms of 0.76



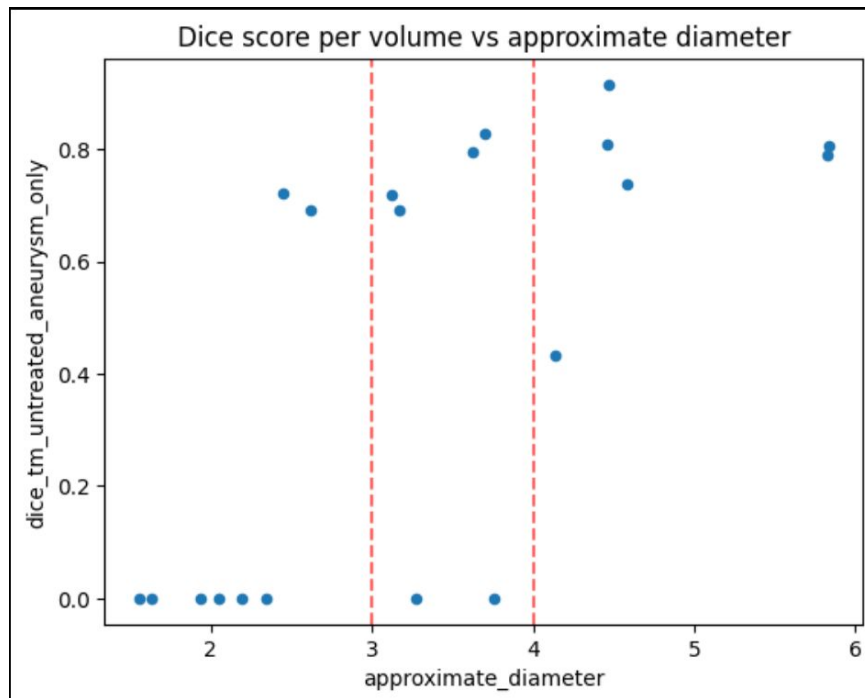
Results with nnUnet for the ADAM dataset

- [ADAM challenge](#) dataset (113 scans)
- With nnUnet, we have a dice score of 0.4465, with a class imbalance ratio of $6.5e-6$
- As this dataset contains examples of smaller UIAs, we can see the effect of aneurysm size more directly

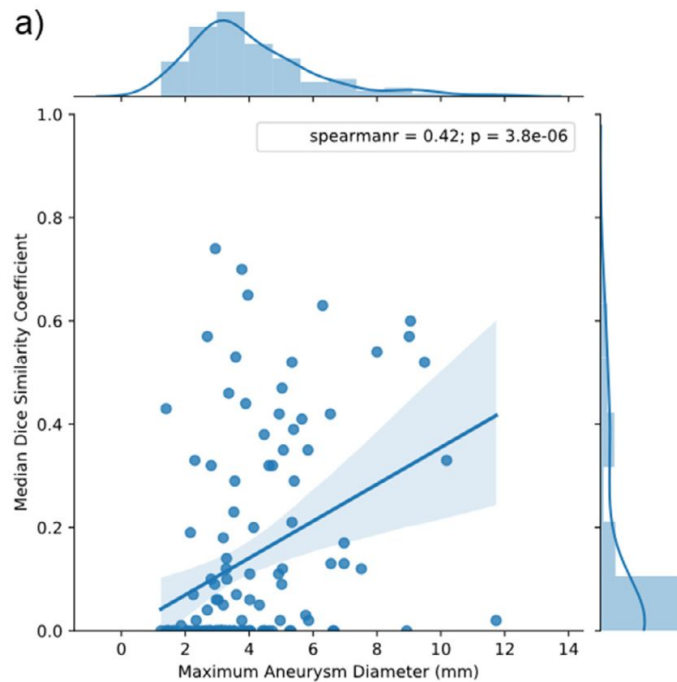
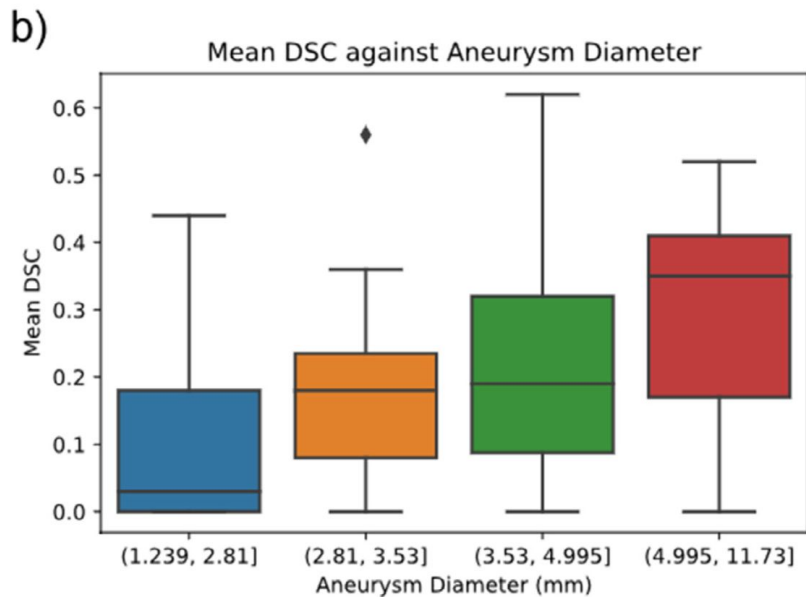
Diameter	Dice Score [UIA Segmentation]	Support
d < 3mm	0.1767	8
3mm <= d < 4mm	0.5048	6
d >= 4mm	0.7480	6

Results with nnUnet for the ADAM dataset

Diameter	Dice Score [UIA Segmentation]	Support
$d < 3\text{mm}$	0.1767	8
$3\text{mm} \leq d < 4\text{mm}$	0.5048	6
$d \geq 4\text{mm}$	0.7480	6



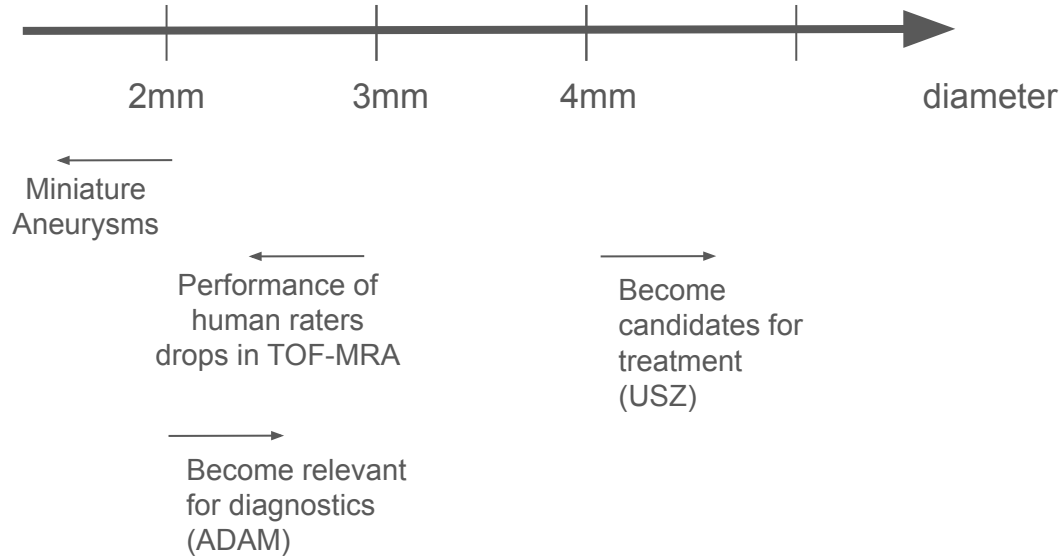
Results from the ADAM Challenge itself



Doctors also have a hard time identifying UIAs with $d < 3\text{mm}$

- “The sensitivity of all [human] readers (38% to 55%) was significantly lower for small aneurysms (ie, those $< 3\text{ mm}$ in maximum diameter) than for large aneurysms (68% to 89%)” <https://pubmed.ncbi.nlm.nih.gov/12105357/>
- “Aneurysms with maximal length $< 5\text{mm}$ has a 42.96% FPR on TOF-MRA scans” <https://pubmed.ncbi.nlm.nih.gov/32881975/>

Aneurysms in relation to their size



Aneurysms in relation to their size

Most likely, I think we can aim to see the biggest improvement in segmentation performance for aneurysms in the range $3\text{mm} \leq d \leq 4\text{mm}$, followed by $d \geq 4\text{mm}$.

For $d < 3\text{mm}$ or $d < 2\text{mm}$, we start to reach the limit of the TOF-MRA modality

Diameter	Dice Score [UIA Segmentation]	Support
$d < 3\text{mm}$	0.1767	8
$3\text{mm} \leq d < 4\text{mm}$	0.5048	6
$d \geq 4\text{mm}$	0.7480	6

