SURF2022 HUBMAP COMPETITION REPORT

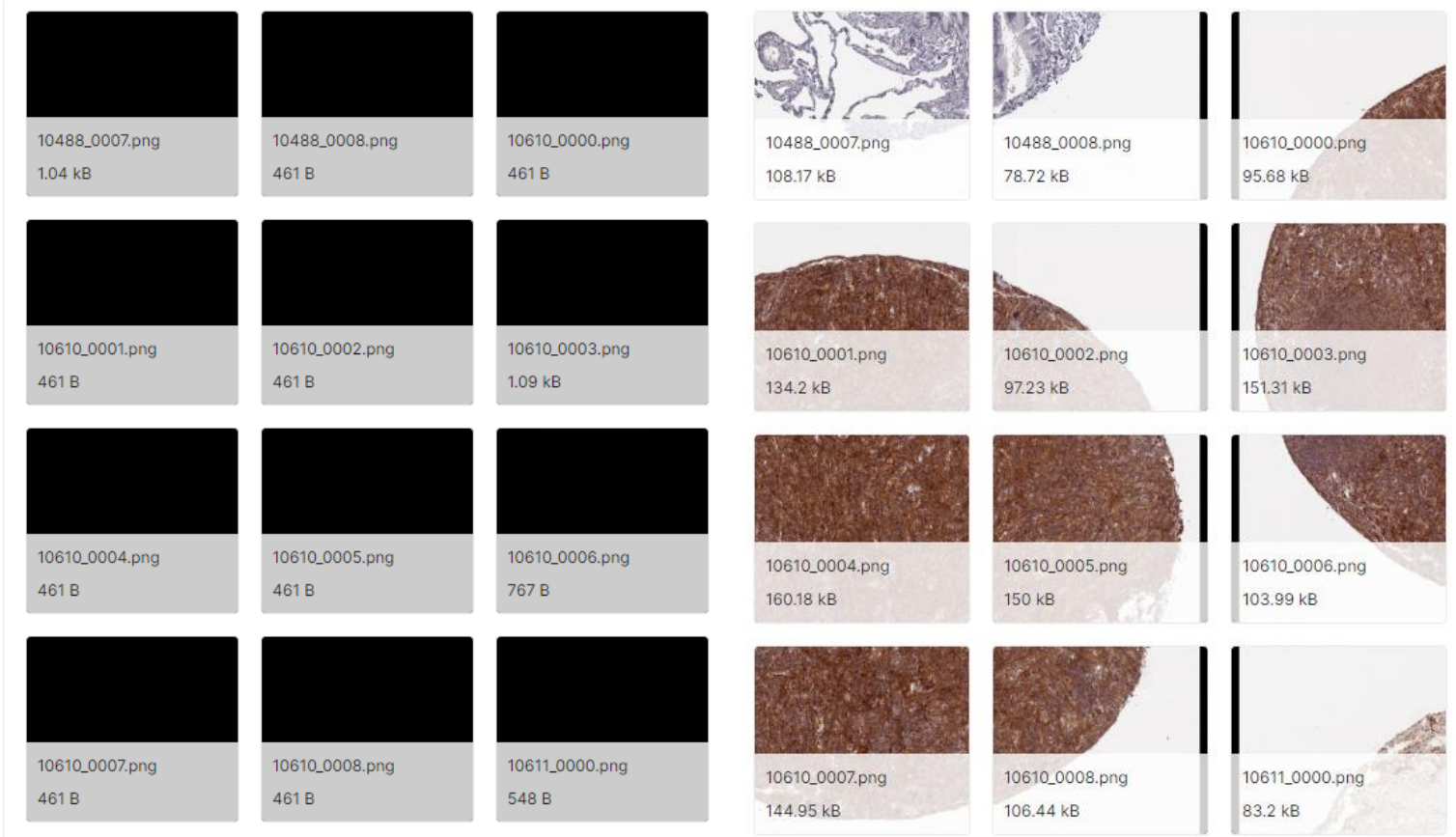
GROUP B

CONTEXT

- Underfitting Organs
- Larger models may help

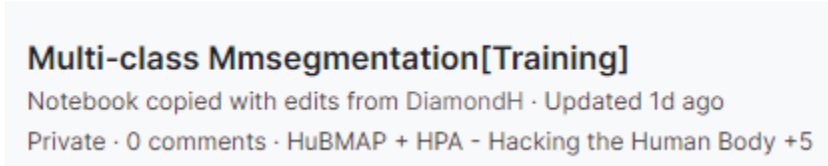
TILED LUNG SAMPLES

- As the masks are really scarce in samples, and the number of samples are limited. Underfitting is a major problem on lung organ segmentations.
- Also, under tiled strategy, the context information is limited by the tile boundaries. So the neural networks may not "notice" patterns of lung organs.



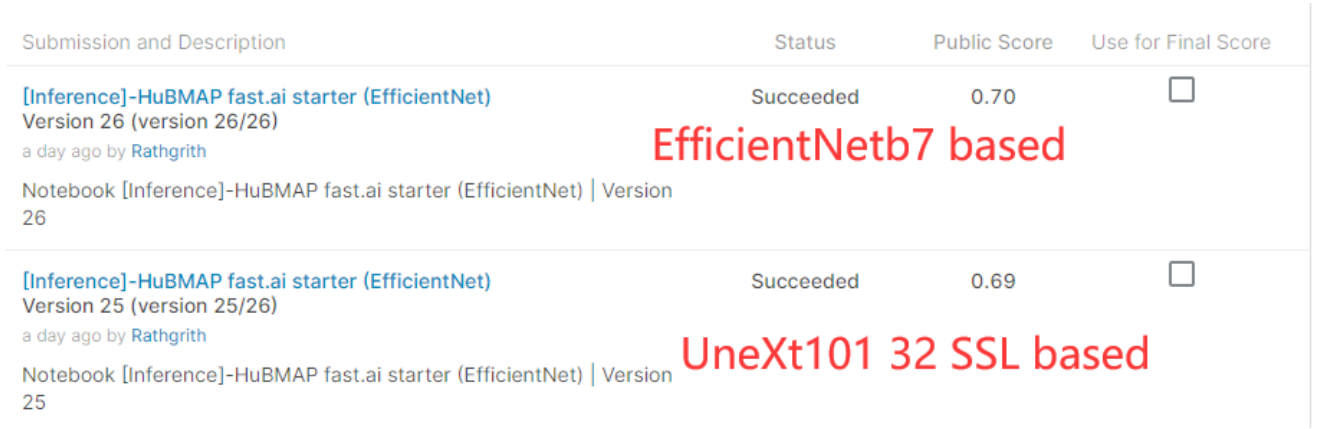
TWO SOLUTIONS POSSIBLE

- External datasets (Need handcrafted annotation!)
  - https://www.kaggle.com/rathgrith/notebook78da7798f8
  - https://hubmapconsortium.org/hubmap-data/
- Conditional Prediction (Take class information into consideration in neural networks)



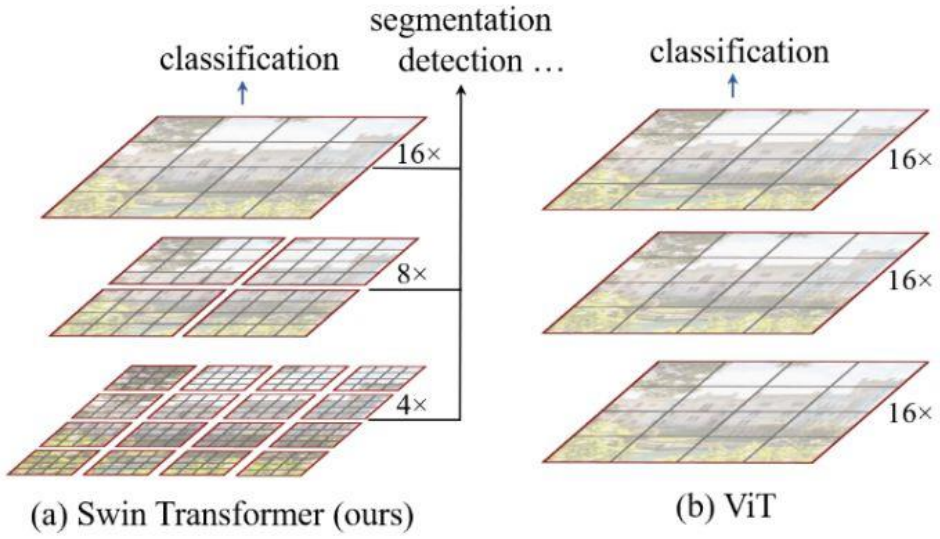
UNEXT101 WITH MORE DIMENSIONS FAILED

- From the experiment we can know that, larger models do not necessarily better on performance.
- Some structural improvement is essential to make breakthrough in benchmarking.



FPN VS SWIN-TRANSFORMER

- Swin Transformer is based on Vision Transformer using a sliding window to transform. It divides the fixed-size sampling blocks in Vision Transformer into blocks of different sizes (Windows) according to the level.
- So that it can grasp inter-tile embeddings which is impossible for FPN-styled traditional CV models.
- https://arxiv.org/pdf/2205.08534v2.pdf



SWING-UNET IMPLEMENTATION

			VALID				TRAIN/BATCH	
rate	iter	epoch	dice	loss	tp	tn	loss	time
5.00e-5	00032706*	711.00	0.923	0.025	0.0000	0.000	0.035	0.041	16930.022489786148
5.00e-5	00032844*	714.00	0.924	0.024	0.0000	0.000	0.030	0.036	17001.920897483826
5.00e-5	00032982*	717.00	0.927	0.024	0.0000	0.000	0.035	0.041	17074.231830596924
5.00e-5	00033120*	720.00	0.923	0.024	0.0000	0.000	0.031	0.037	17145.608330249786
5.00e-5	00033258*	723.00	0.928	0.024	0.0000	0.000	0.033	0.039	17219.272037267685
5.00e-5	00033396*	726.00	0.924	0.024	0.0000	0.000	0.033	0.039	17291.06951236725

- Highest: 0.928 (Possible overfitting)

- Take the middle model, the average accuracy is 0.85:

5.00e-5	00016698*	363.00	0.849	0.031	0.0000	0.000	0.052	0.058	8640.236743450165
5.00e-5	00016836*	366.00	0.866	0.032	0.0000	0.000	0.046	0.053	8710.636823892593
5.00e-5	00016974*	369.00	0.860	0.031	0.0000	0.000	0.043	0.049	8780.660138607025
5.00e-5	00017112*	372.00	0.878	0.031	0.0000	0.000	0.043	0.049	8852.54458808899
5.00e-5	00017250*	375.00	0.853	0.032	0.0000	0.000	0.043	0.050	8923.871765375137
5.00e-5	00017388*	378.00	0.856	0.033	0.0000	0.000	0.044	0.051	8994.149913311005
5.00e-5	00017526*	381.00	0.846	0.031	0.0000	0.000	0.042	0.049	9066.33791065216
5.00e-5	00017664*	384.00	0.878	0.031	0.0000	0.000	0.043	0.050	9136.122956037521

FUTURE PLAN

- Inference configuration of SwingUNet.
- Try to involve external dataset.

Thank you!