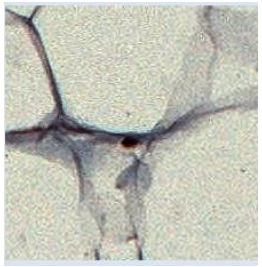
TNBC Biopsy Analysis with Supervised Networks

Problem Statement

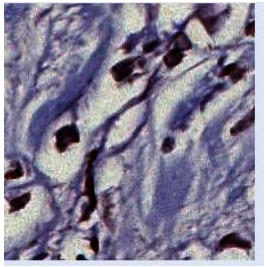
- Triple Negative Breast Cancer (TNBC)
- Develop an interface to aid TNBC Detection in Whole Slide Images (WSIs) of patients
  - Detection of Cancer
  - Quantification of relevant features (TILs, Tumour cells - deeper than cell level?)
  - Correlation between feature occurrence and cancer to infer relevant characteristics
- Currently at an early stage - Classification

Annotated Dataset 1292 patches (80-20 train-valid split)

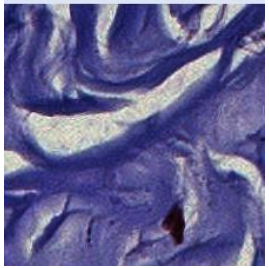
1. Black Space



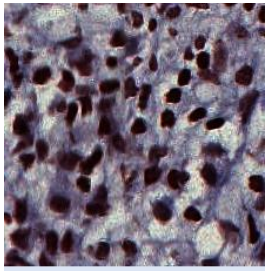
2. Fat Cells



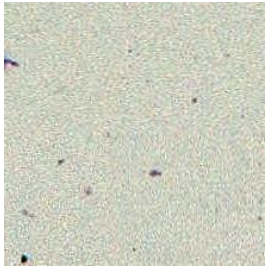
3. Stroma and TILs



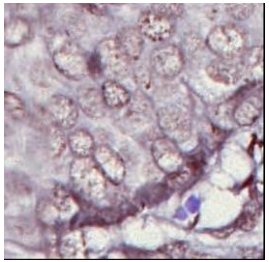
4. Stroma



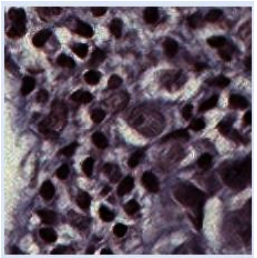
5. TILs



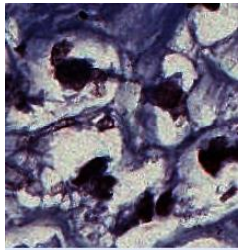
6. White Space



7. Tumour

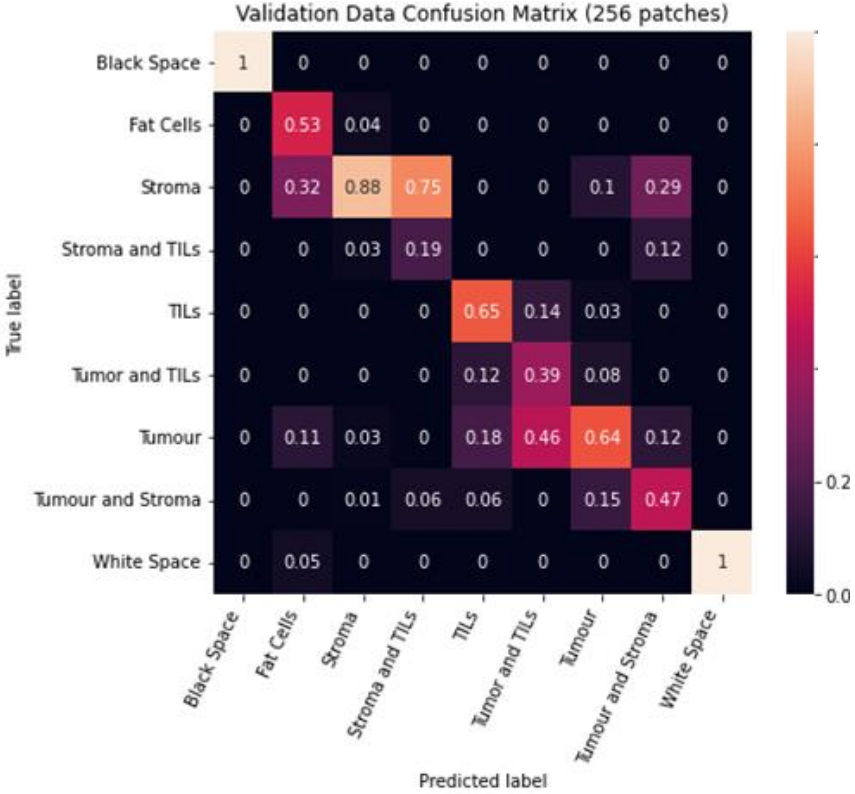


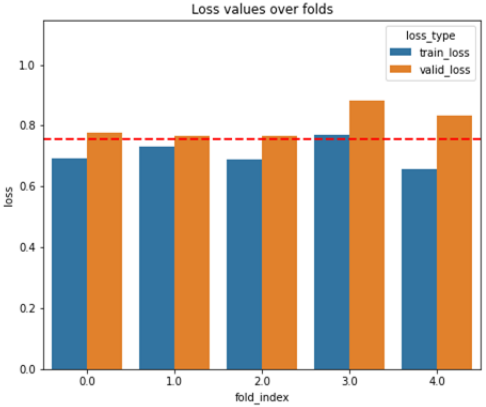
8. Tumour & TILs

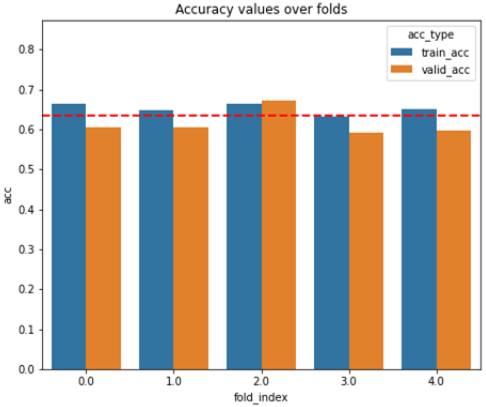


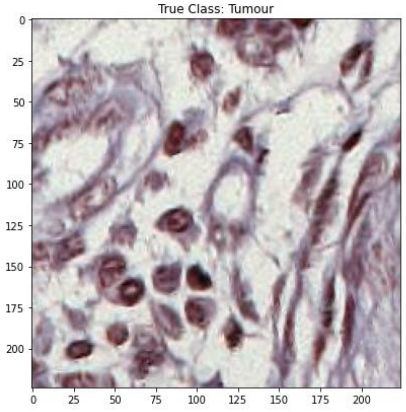
9. Tumour & Stroma

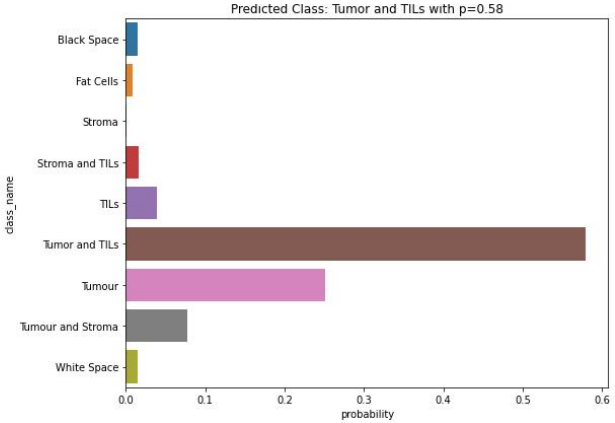
ResNet – with Transfer Learning on our dataset



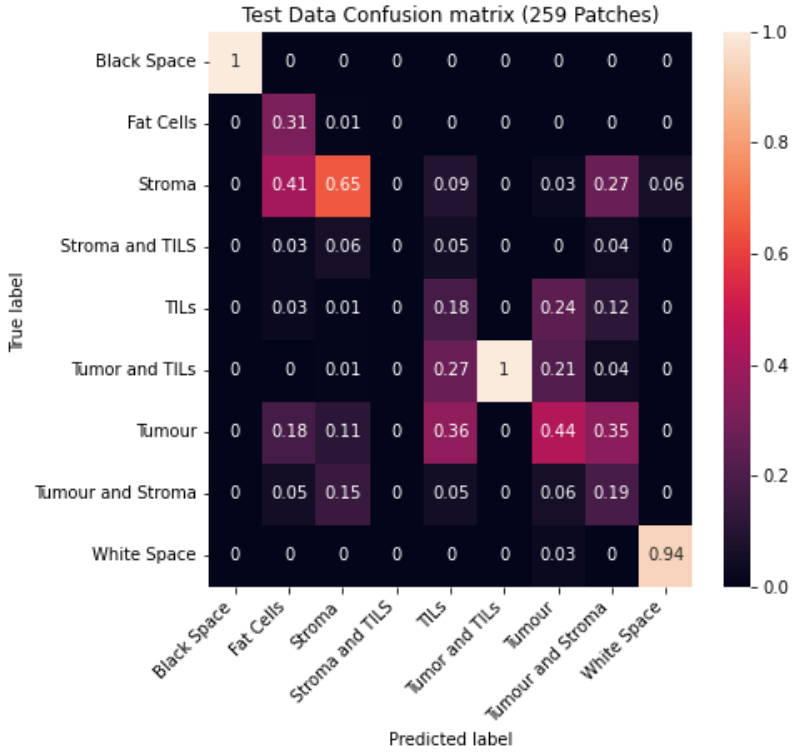


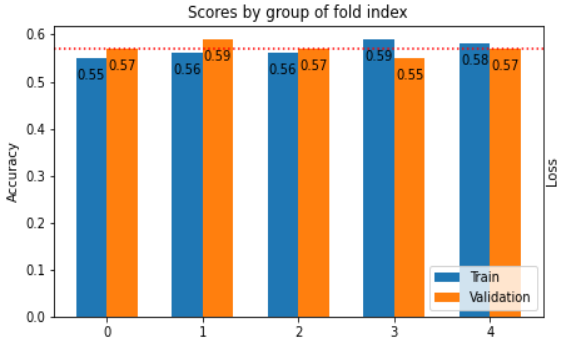


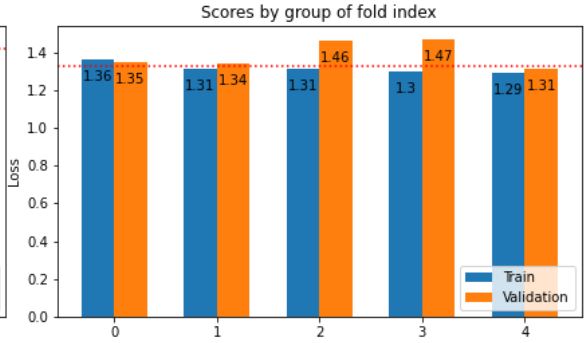




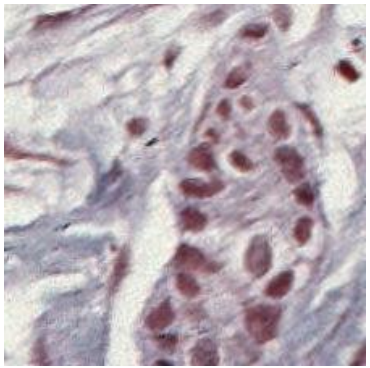
EfficientNet – with Transfer Learning on our dataset

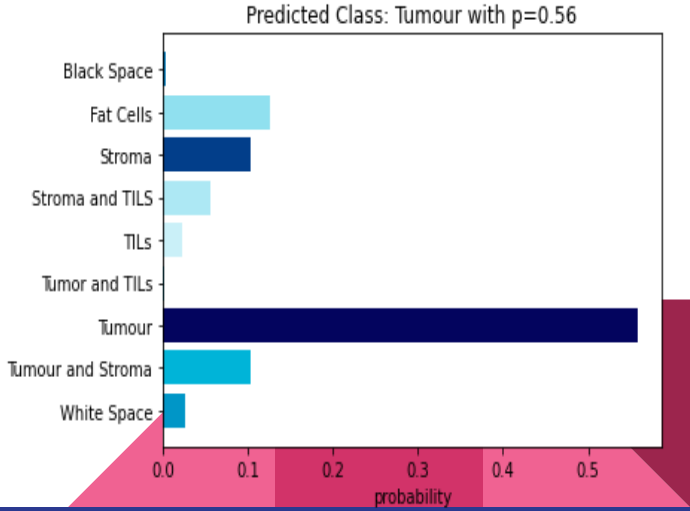




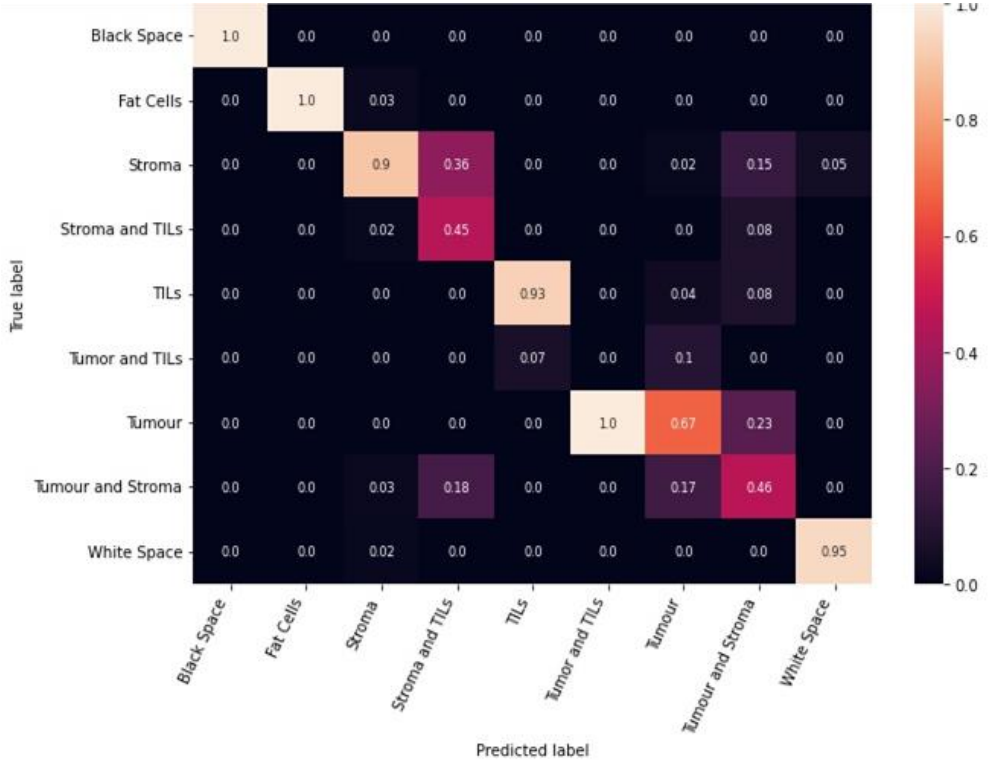


True class: Tumour and Stroma





Vision Transformers – with Transfer Learning on our dataset



	precision	recall	f1-score	support
Black Space	1.0000	1.0000	1.0000	4
Fat Cells	1.0000	0.7778	0.8750	9
Stroma	0.9032	0.8485	0.8750	66
Stroma and TILs	0.4545	0.6250	0.5263	8
TILs	0.9333	0.7778	0.8485	18
Tumor and TILs	0.0000	0.0000	0.0000	6
Tumour	0.6667	0.8205	0.7356	39
Tumour and Stroma	0.4615	0.5000	0.4800	24
White Space	0.9524	0.9524	0.9524	21
accuracy			0.7692	195
macro avg	0.7080	0.7002	0.6992	195
weighted avg	0.7699	0.7692	0.7657	195

Upcoming Research

- Continuing supervised learning with more labels
  - Finer-detailed labelling for cell structures
  - Labour-intensive
- Unsupervised learning potential
  - Reduce reliance on labelled data
  - Clustering algorithms
- Exploring different paradigms
  - Segmentation and Detection
  - Combination of paradigms