

# Prediction of ki67 scores from H&E WSIs using CNNs

## Context

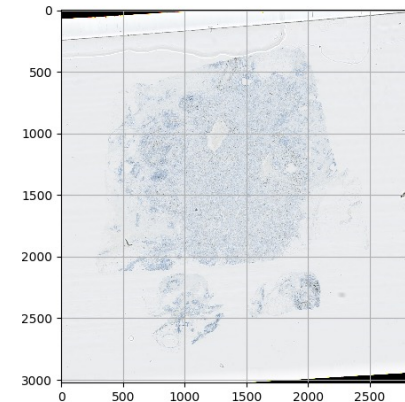
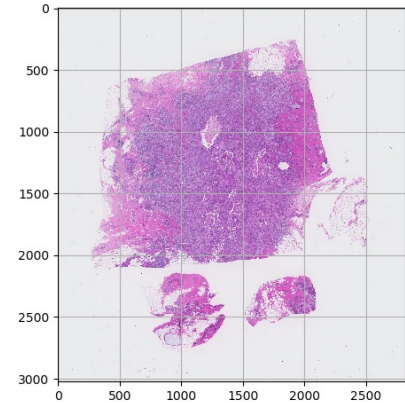
- ki67 scoring can aid the stratification of ER+ breast cancer patients
- lacks analytical validity and standardization in sample preparation
- prior studies demonstrated that there is at least some information on ki67 expression in H&E

## Objective

- develop a CV model that can predict tumor average ki67 positive percentage from H&E stained WSIs

## Materials

- pilot: 126 matched ki67 and H&E WSIs
- full study: >1500 matched ki67 and H&E WSIs



# Comparison of four models

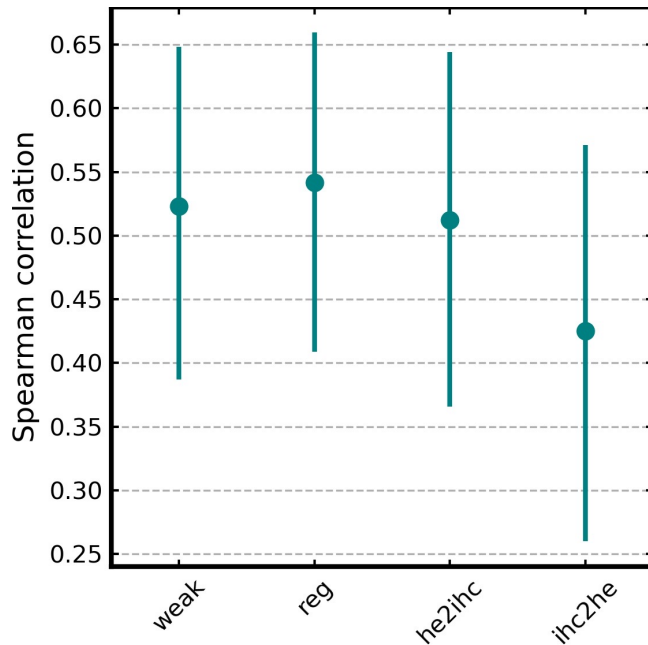
1. ki67 tumor average as weak label for each tile of the corresponding H&E WSI
2. register negative and positive detected cells from ki67 to H&E

Cycle-GAN for unpaired domain transformation:

3. transform H&E tiles to ki67 domain, predict with model that was trained with “real” ki67 image tiles
4. transform ki67 tiles to H&E domain, train CNN with “fake” H&E tiles, predict with real H&E tiles

# Model performances & conclusions

Spearman correlation between ki67 score from IHC and from prediction from H&E



- registration performs narrowly best, but wide confidence intervals
- we suspect that registration could be improved, but challenging due to different stains and non-consecutive slides
- Cycle-GAN results in line with similar studies, where predicting on generated images performs better than training with generated images

Let's see what happens once we add the additional 1500 paired WSIs!

We are looking forward to discussions about what else would be interesting to try!