Prostate cANcer graDe Assessment (PANDA) Challenge

Derechowski, Markiewicz, Nyczka

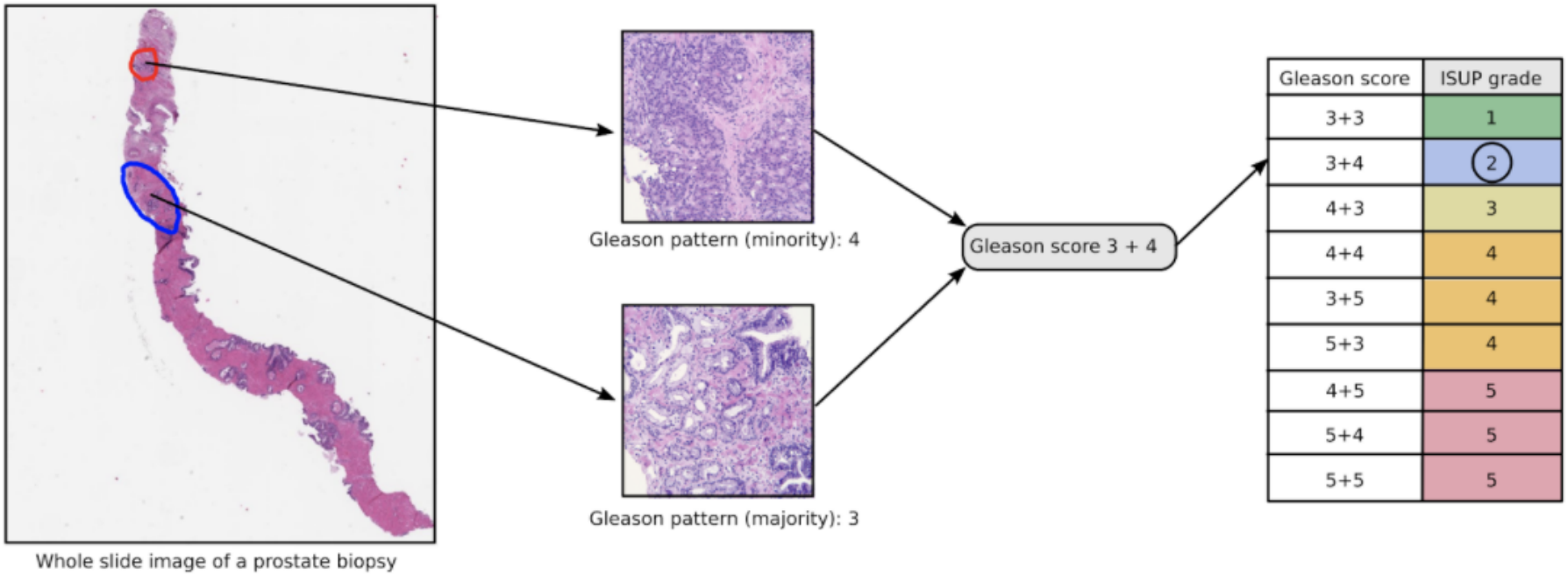
University of Wrocław

September 26, 2020

Introduction

- Kaggle challenge
- detecting prostate cancer on tissue samples

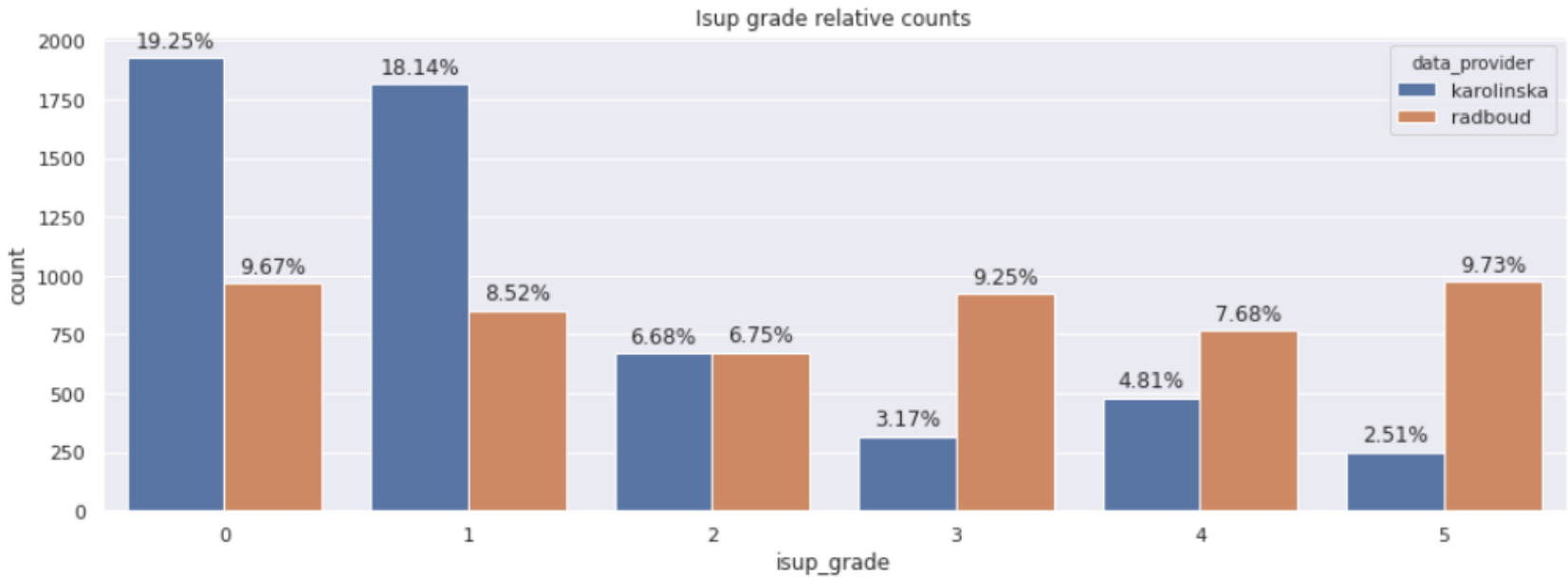
Scoring



- image classification
- scoring based on Gleason scale (tissue type) mapped into ISUP scale

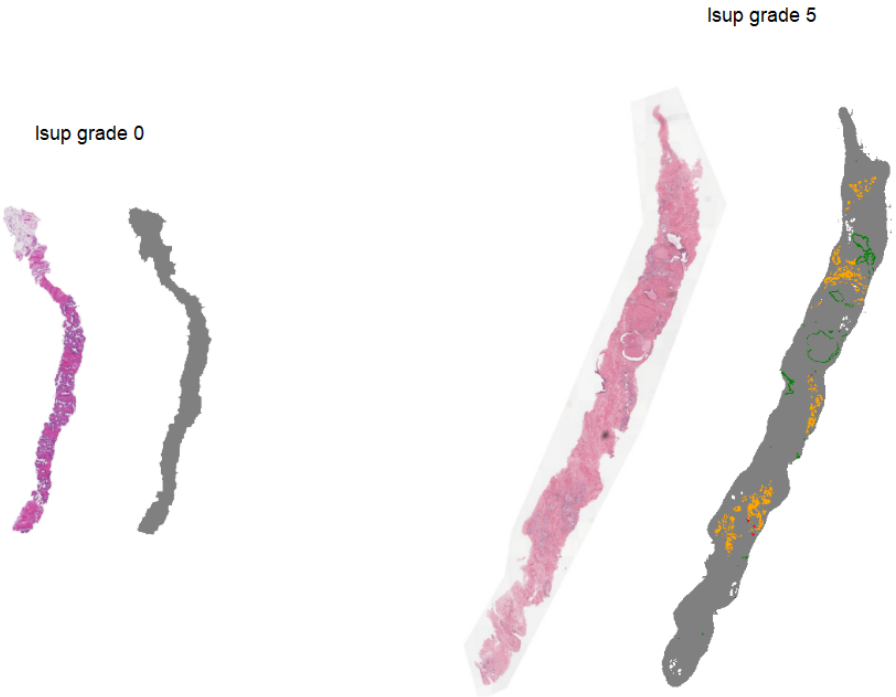
Data distribution

- equal number of samples for both data provider
- unequal class distribution
- different class distribution for both providers



Our approach

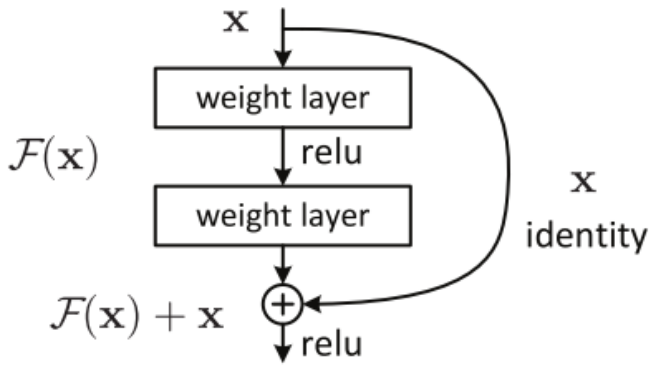
- We choose to make classification based on ISUP ranking



- trying both 6-class classification and regression with one output neuron

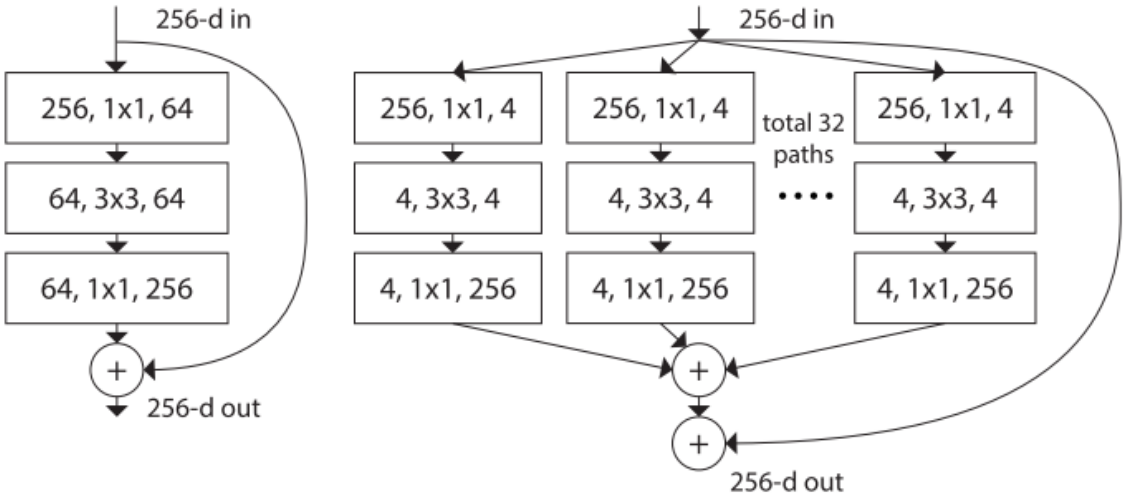
ResNet

- Residual network - shortcuts to avoid vanishing gradient problem, allows for deeper networks



ResNext

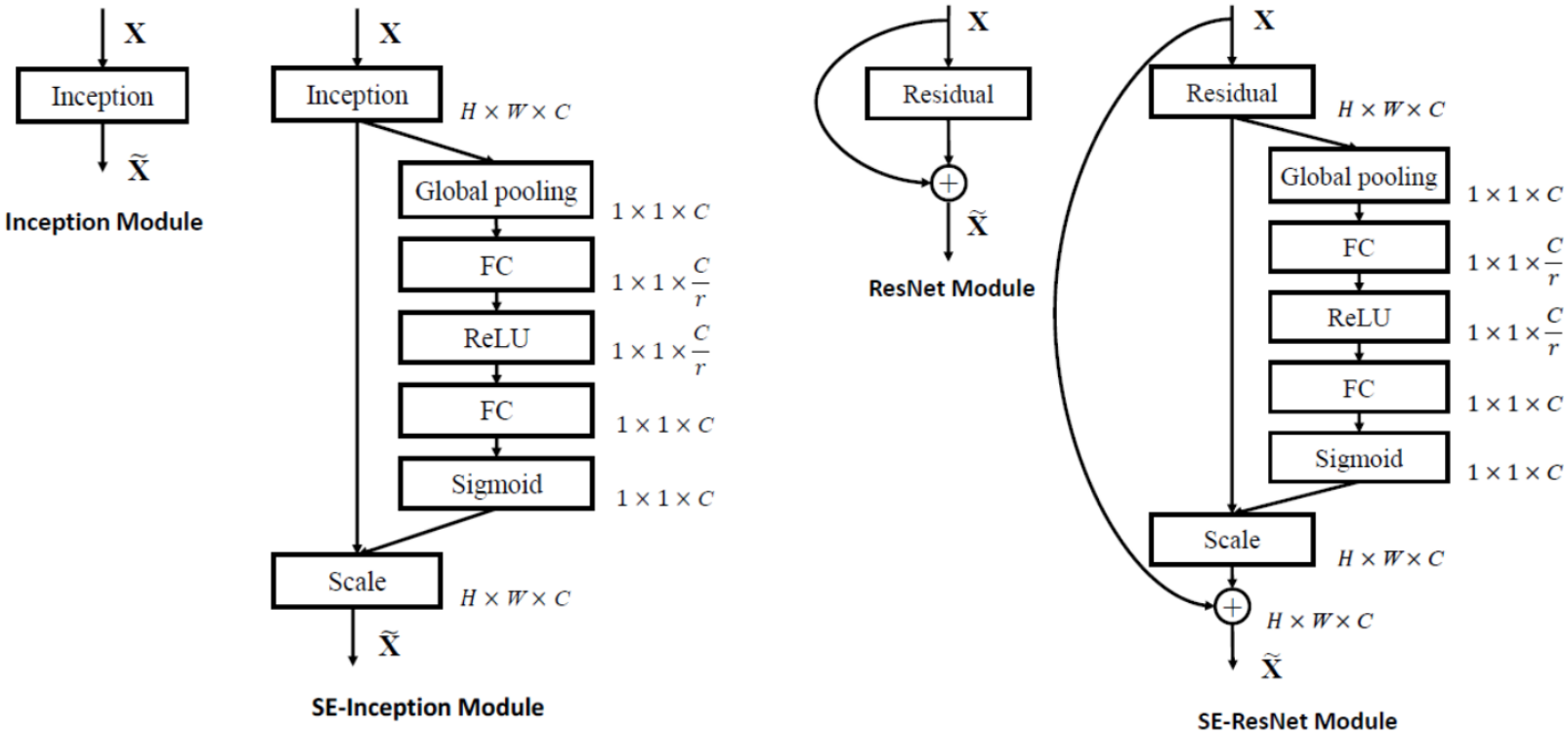
- Resnext - also uses split, transform, merge, which are then summed up



- number of independent paths is another hyperparameter for net tuning

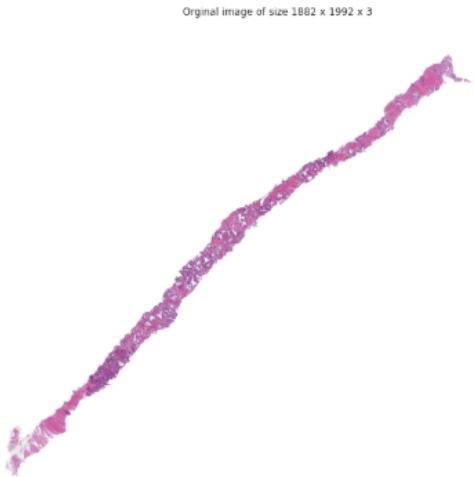
Squeeze-and-Excitation Networks

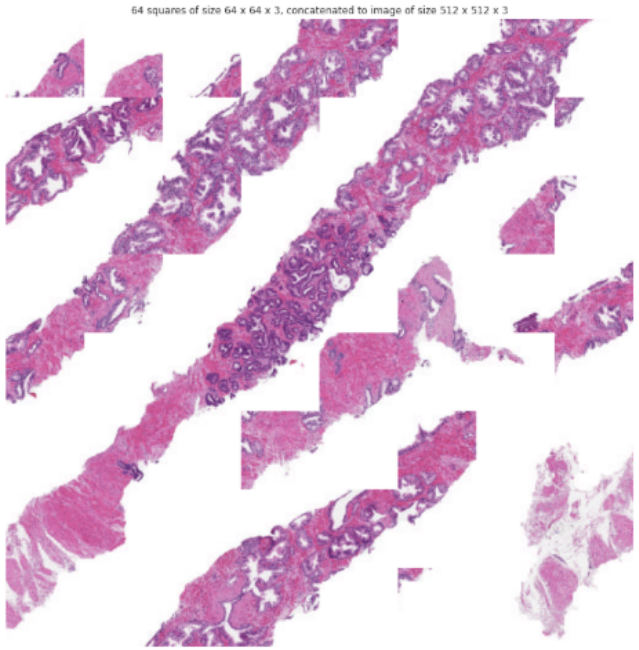
- SE block adaptively recalibrates channel-wise feature responses by explicitly modeling interdependencies between channels



Attempts - PNG caching

- At first we tried to preprocess all images by cutting up the significant parts and we tried to do it beforehand to decrease overall training time.





- Since it didn't speed up the process significantly, it was easier for us to work with original data and preprocess it in-flow.

Other attempts

- batch and image size - option 64x64x64 works slightly better than the others
- tried to merge little squares randomly, by the amount of valuable pixels and using heuristic
- ADAM and SGD with different learning rates
- different alpha scheduler's factors
- data transforms and augmentation
- different number of epochs

Result

First tries:

- regression (3 epochs) - 0.79 CV score and 0.55 LB score
- after some bugs fixing - 0.79 CV score and 0.72 LB score
- classification (3 epochs) - 0.75 CV score and 0.74 LB score

After parameters tuning:

- classification (25 epochs) - 0.83 CV score and 0.78 LB score
- regression (25 epochs) - 0.87 CV score and 0.77 LB score

Plans

- more parameters tuning
- test longer and shorter training
- more data preprocess

What did we learn

- work organization
- dealing with big dataset
- se-resnext architecture
- re-training big net
- choosing parameters with time-consuming training
- how hard is to make effective model

References


ttps://towardsdatascience.com/review-resnext-1st-runner-up-of-ilsvrc-2016-image-classification-15d7f17b42ac


ttps://towardsdatascience.com/an-overview-of-resnet-and-its-variants-5281e2f56035


ttps://towardsdatascience.com/understanding-and-visualizing-resnets-442284831be8


ttps://arxiv.org/pdf/1709.01507.pdf