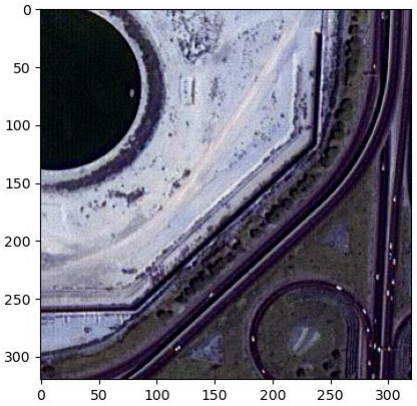
Loss Functions

Loss Functions

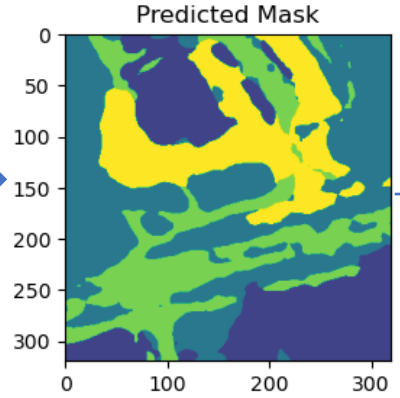
Introduction

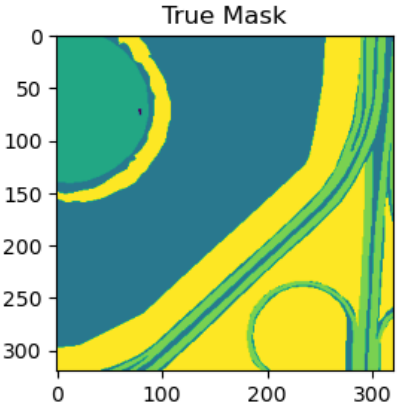


Input Image

Neural Network

Forward Pass





Loss Function

Class Score

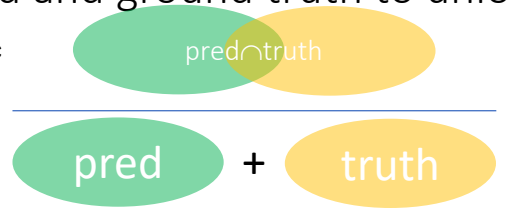
Location

Loss Functions

Dice Coefficient

- Sørensen–Dice Coefficient
- evaluates the similarity of samples
- similarity measure over sets
- measures overlap between predicted segmentation and ground truth
- ratio of intersection of predicted and ground truth to union of segmentations

$$DSC = \frac{2|X \cap Y|}{|X|+|Y|} = \frac{2TP}{2TP+FP+FN} = 2 *$$



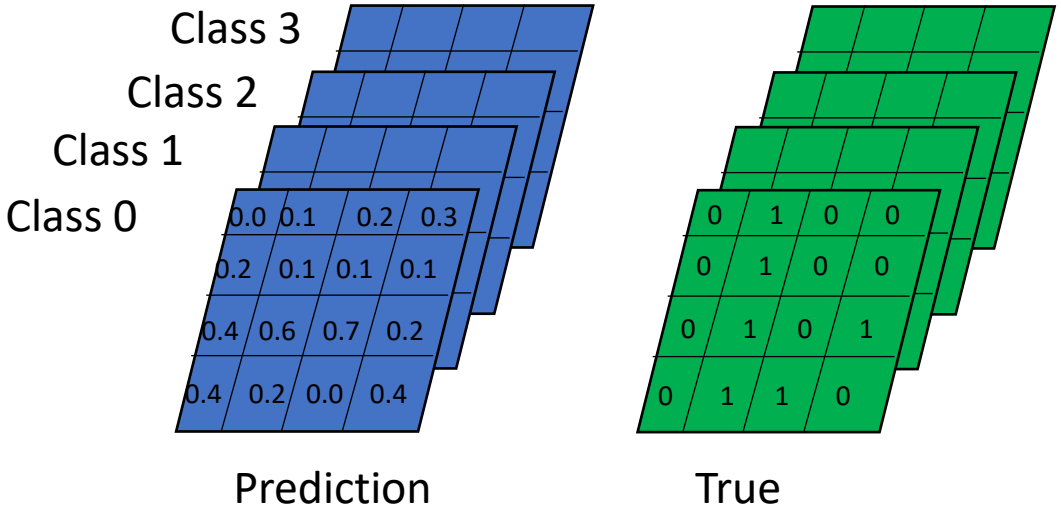
- dice coeff = 1…perfect overlap (of prediction and ground truth)
- dice coeff = 0…no overlap
- TP…number of pixels common to both images (mask and prediction)
- FP…number of pixels common to mask image
- FN…number of pixels common to prediction image

Loss Functions

Dice Coefficient

$$SoftDiceLoss = 1 - \frac{2\sum_{pixels} y_{true} y_{pred}}{\sum_{pixels} y_{true}^2 y_{pred}^2}$$

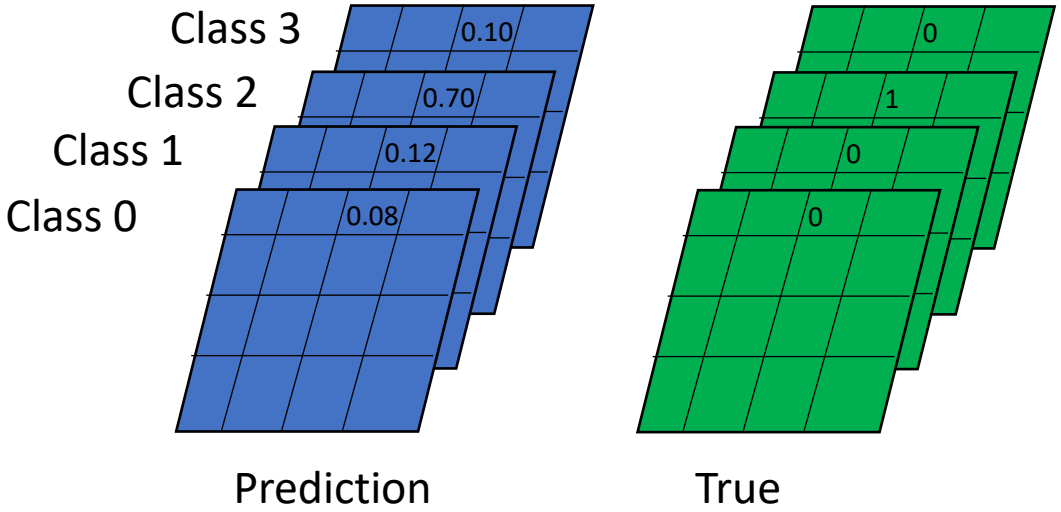
repeated for all classes, then averaged



Loss Functions

Pixel-Wise Cross Entropy Loss

- each pixel is analyzed
- class predictions compared to one-hot encoded target
- all results averaged



$$CEloss = -\sum_{classes} y_{true} \log(y_{pred})$$