Report

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1 Loss

As loss function I used *BCE* and *Focal loss*. As my predictions at the beginning, were almost always blank or full, I added another parameter called *round_ ratio* that weights loss that was measured on masks that were discretized, in other words for final output of the model (that is masks of 0 and 1, not the probabilities). The idea was to make model predictions that can be better in practice and not just loss-wise. I had tested loss with both *BCE* and *Focal* versions, *BCE* turned out to be more stable, but *Focal* gave me better results, e.g. once I got 0.9 iou, but unfortunately I couldnt reproduce that phenomenon.

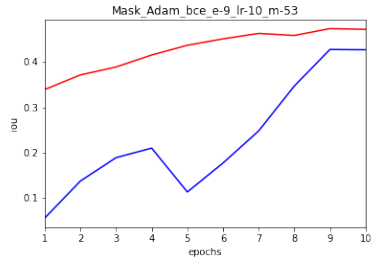
2 Optimization

When it comes to optimizers I didn't see difference between *Adam* and *RMSprop*. Best choice turned out to be starting with learing rate equal to 10^{-3} with warmup and train for the first few epochs only non-backbone parameters. After that I was adding rest of the parameters, and starting again with warmup, making newly added parameters' learing rate a little lower than the others. Throughout the whole process I used scheduler for dropping on plateau.

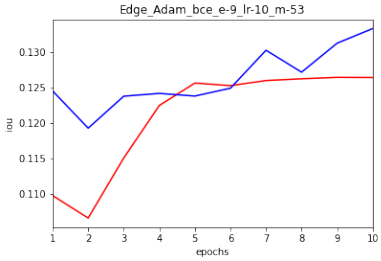
3 Lambda

I tested various amounts of lambda, from 0 to 0.5. I could see that with bigger amounts, edges could be really good, but whole mask wasnt necessarily better. I achieved best results for lambdas between 0.1 and 0.2. I think the thing that made the biggest change in training with edges was when I made my convs take not one pixel of edge, but two (make edges a little wider). It made model training more stable, the reason why I made the decision was the issue - how can model predict such in-continous states, with mask moved just one pixel the value changes from max to min (1 to 0). Probably if I made it even wider with more continous change it would show even better results.

Here is a comparision of IOU for different lambdas smaller than 0.1:

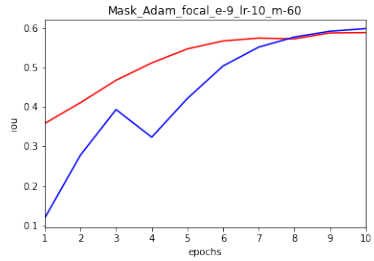


(a) Mask.

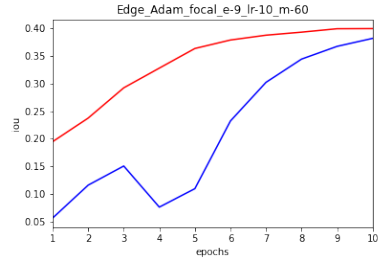


(b) Edge.

Rysunek 1: Lambda: 0

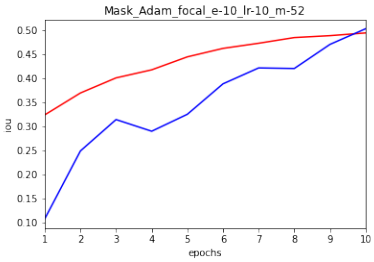


(a) Mask.

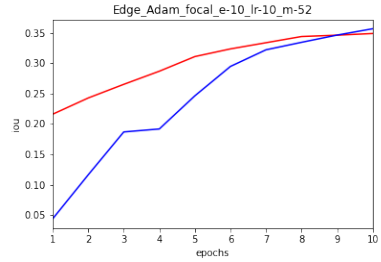


(b) Edge.

Rysunek 2: Lambda: 0.05



(a) Mask.



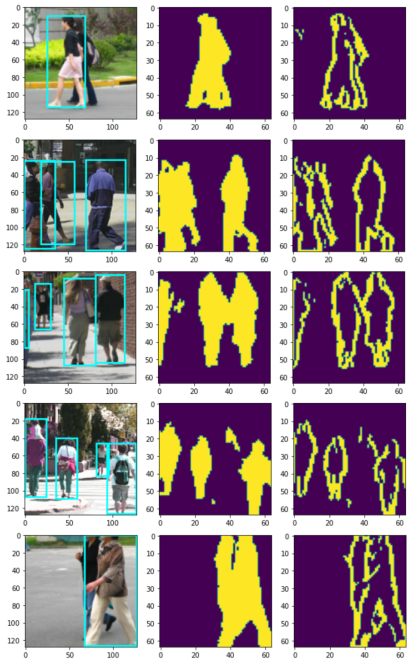
(b) Edge.

Rysunek 3: Lambda: 0.09

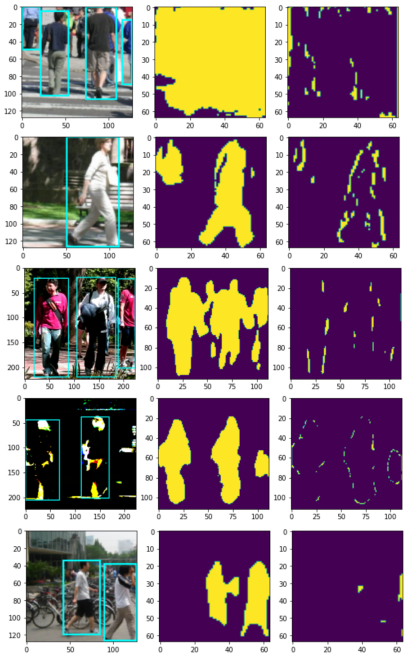
From plots we can tell that edge awarness is important for our model: stability-wise and score-wise.

4 Analysis of Edge Correlations

In my best runs edges definitely look like edges of masks and there is correlation. Worsts happen just at the beginning of training or when model starts to overfit.



Rysunek 4: Good.



Rysunek 5: Bad.