

RAVIR challenge

Introduction

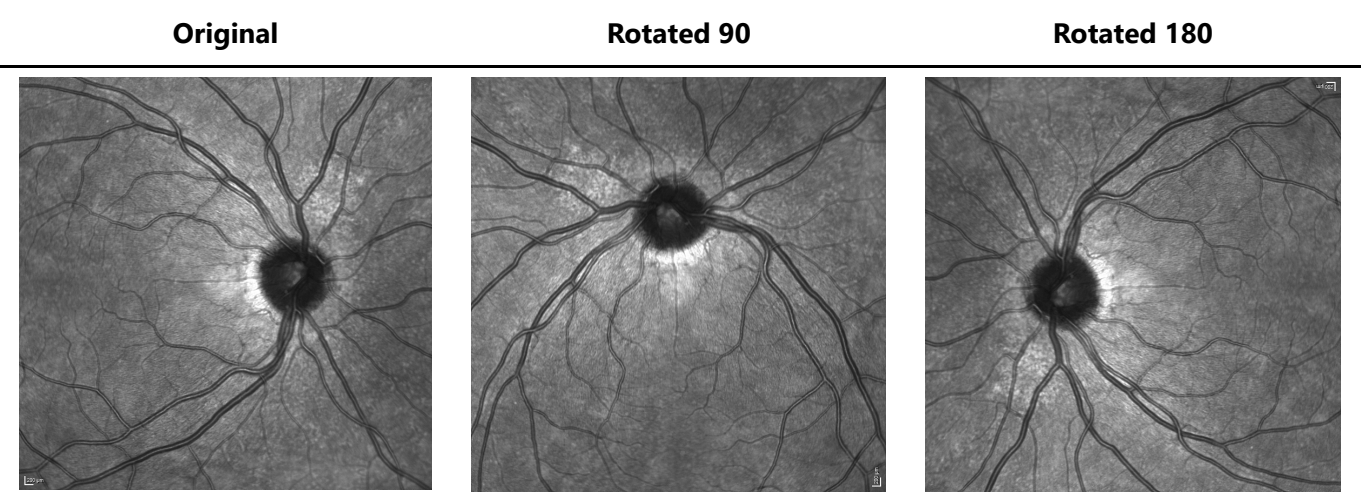
RAVIR: A Dataset and Methodology for the Semantic Segmentation and Quantitative Analysis of Retinal Arteries and Veins in Infrared Reflectance Imaging Challenge.

The original dataset only contains 23 images. Applying Data Augmentation I increased the dataset to 92 images adding 69 images more.

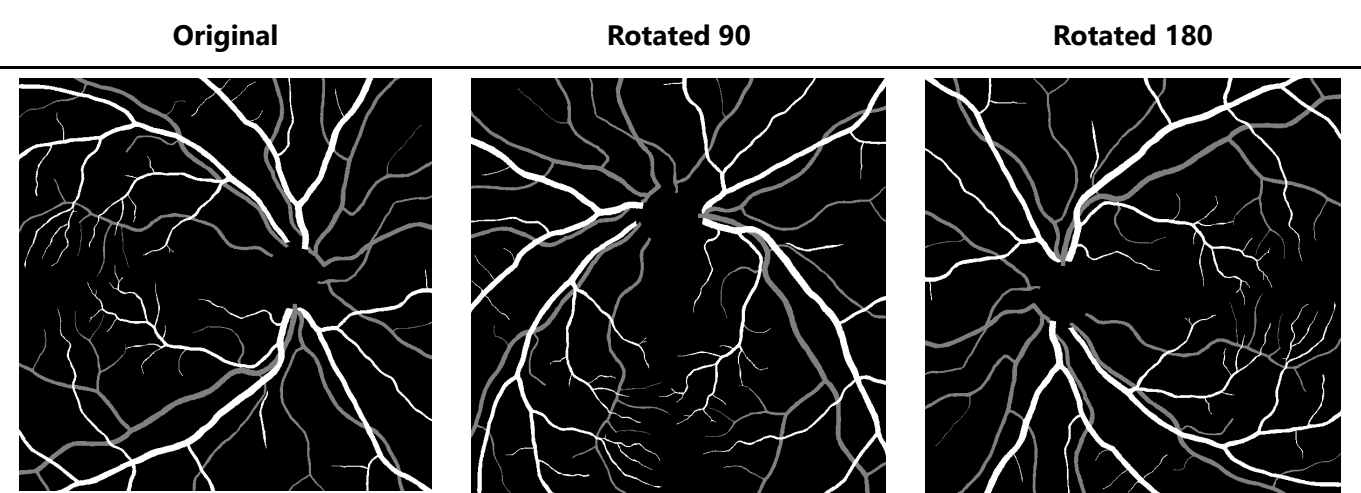
For this practice I trained a different AI with the architecture of Unet. The parameters estuded for see if exists any improvements are Optimizer and Batchsize.

To load images and avoid problems with memory I used a Data Generator for load images during the training, not before and the image size used for train model and test is 512x512.

For test better and see if model has enought data I made a data augmentation rotating age image 90 and 180 degrees for see if exists any improvement with more data. An example is provided below.



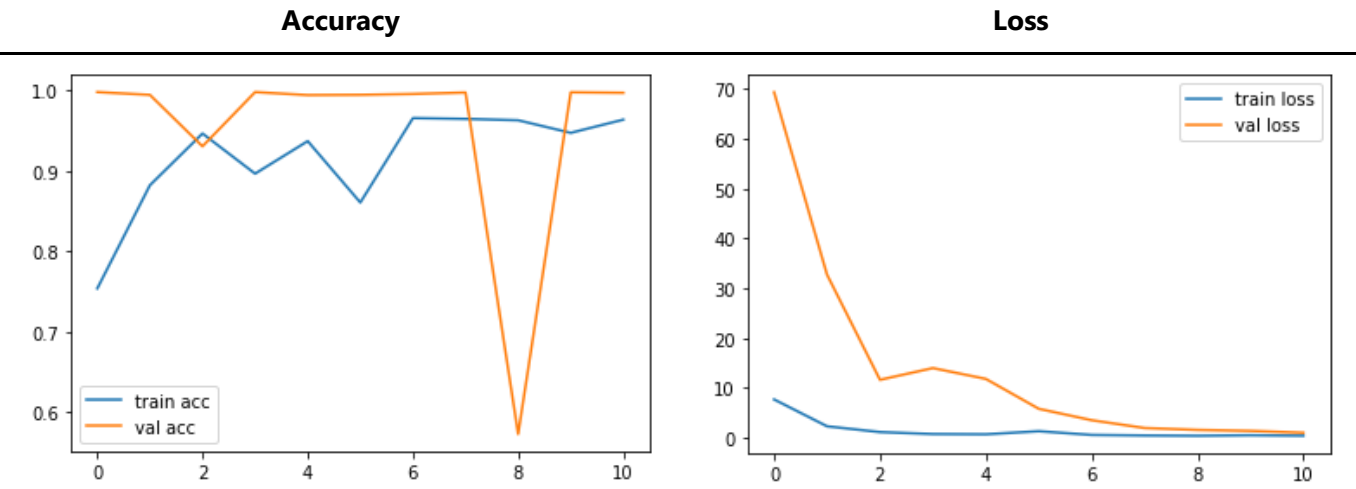
Mask



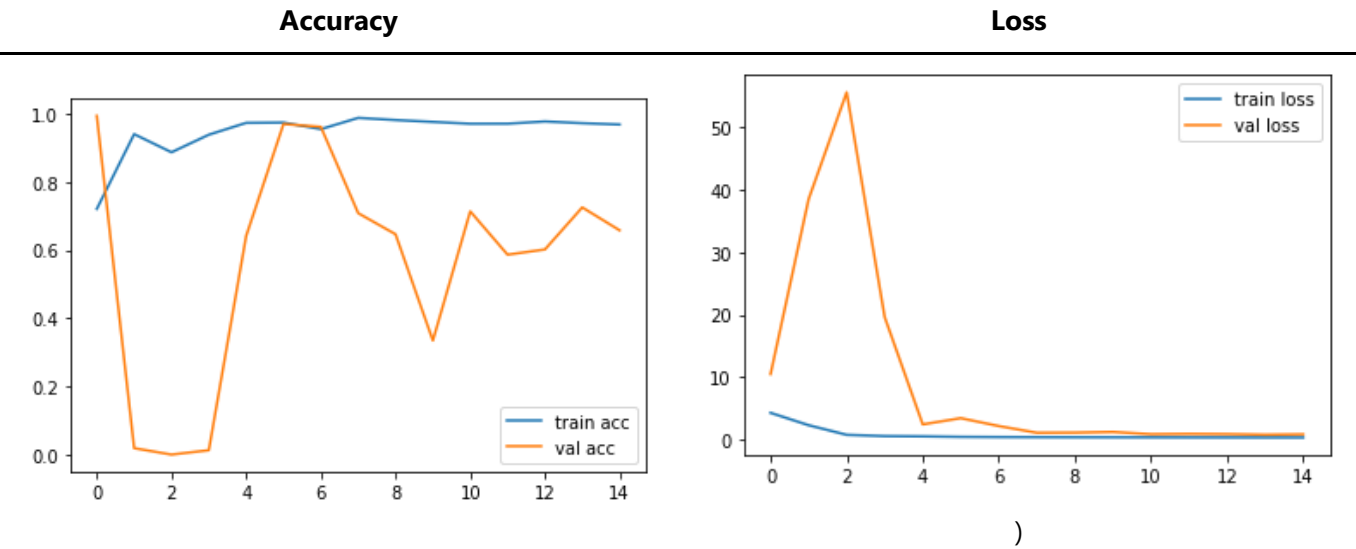
Test and metrics

A differents tests was made. The results during the training can see on the following plots that are below. The plots show was de accuracy and the loss during the training. The diferent test executed was changing first the optimizer. Two optimizers was tested, first RMSPROP and second Adam without data augmentation and the second test was changing the batchsize.

RMSPROP Without Data Augmentation Batchsize 4



Adam Without Data Augmentation Batchsize 4

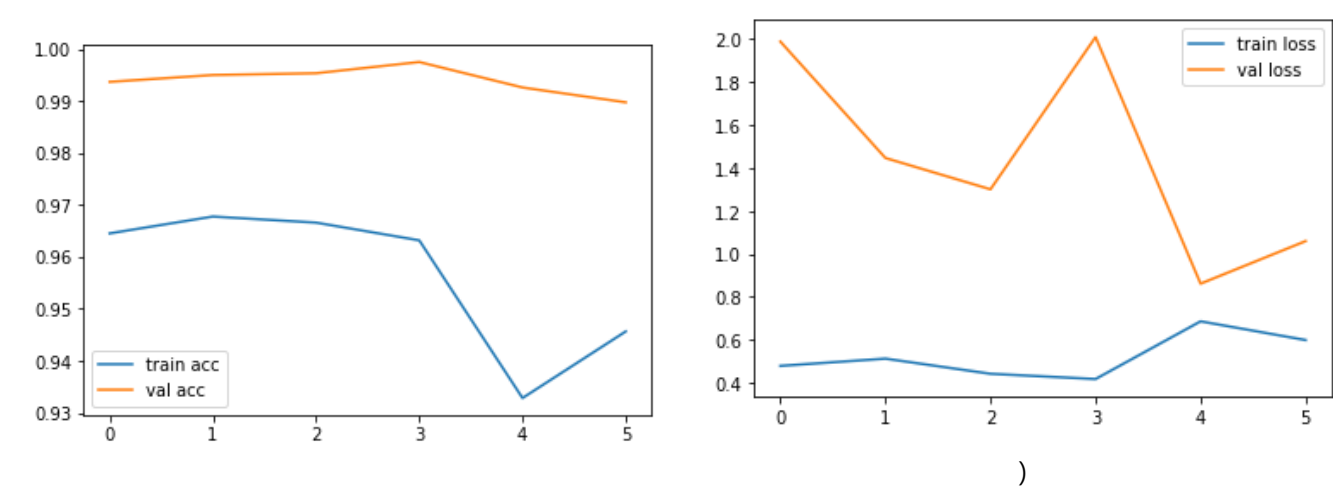


RMSPROP Without Data Augmentation Batchsize 8



Accuracy

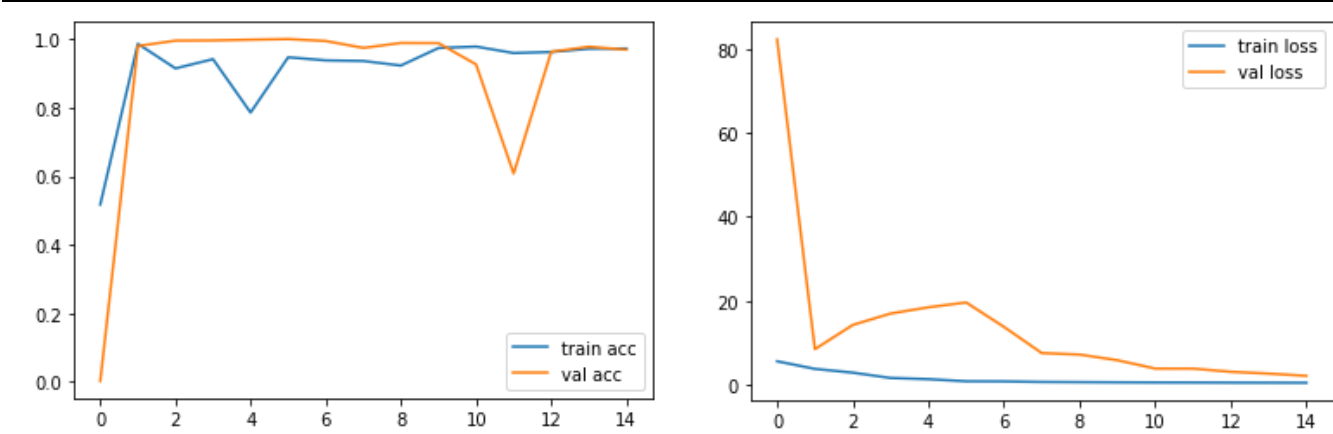
Loss



Adam Without Data Augmentation Batchsize 8

Accuracy

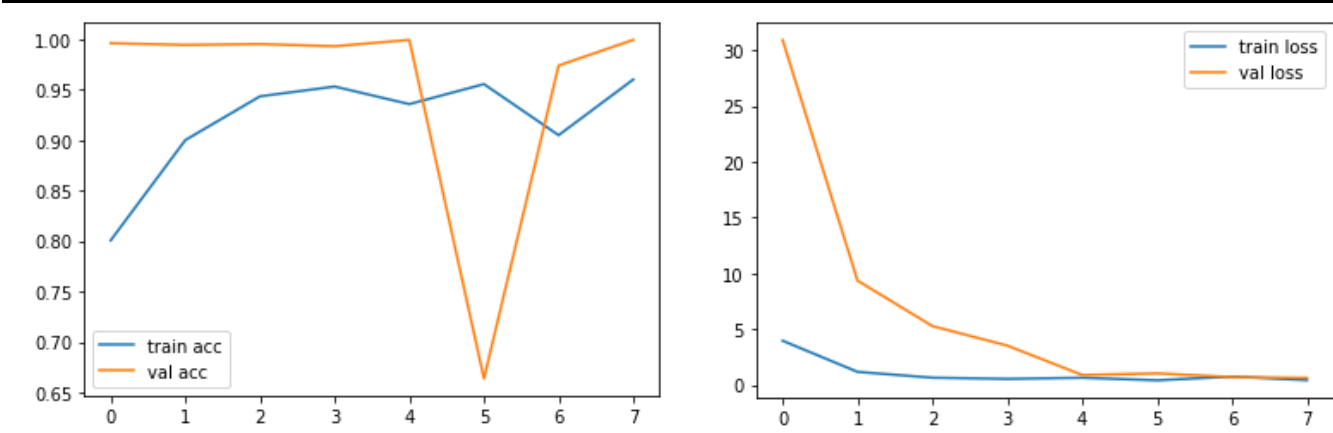
Loss



RMSPROP Data Augmentation Batchsize 8

Accuracy

Loss



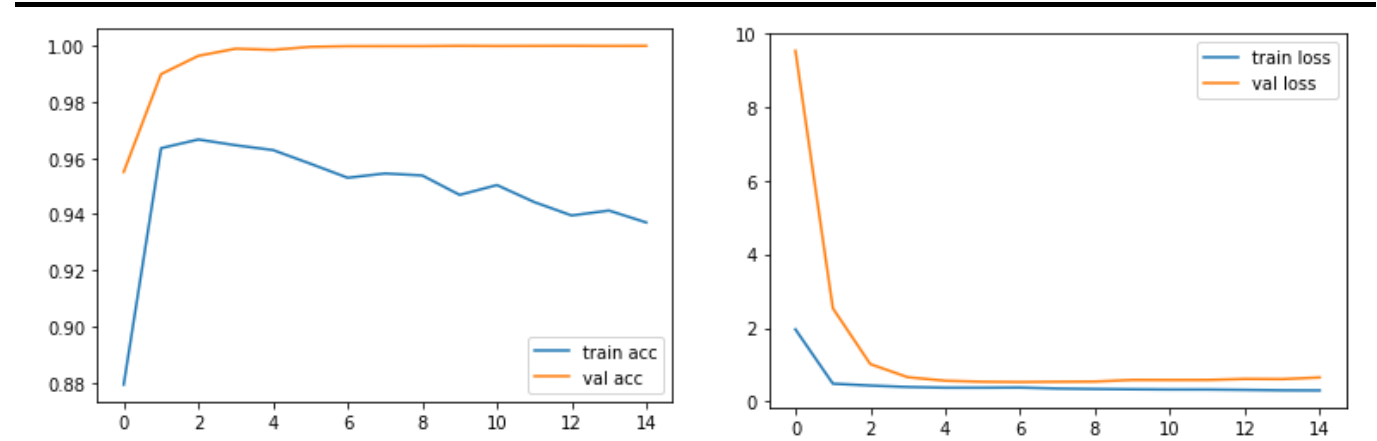
Adam Data Augmentation Batchsize 8

Accuracy

Loss

Accuracy

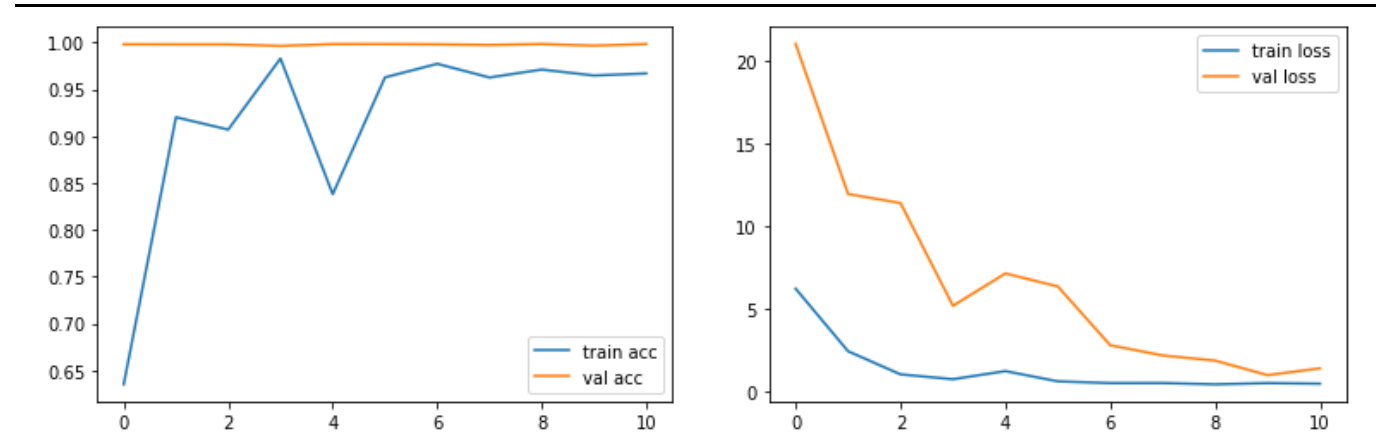
Loss



RMSPROP Data Augmentation Batchsize 16

Accuracy

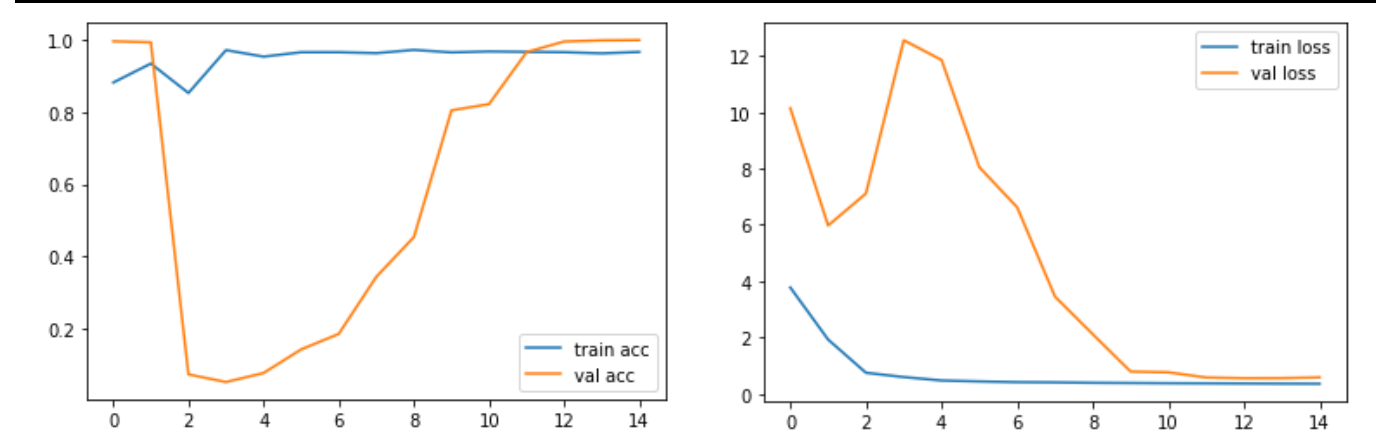
Loss



Adam Data Augmentation Batchsize 16

Accuracy

Loss

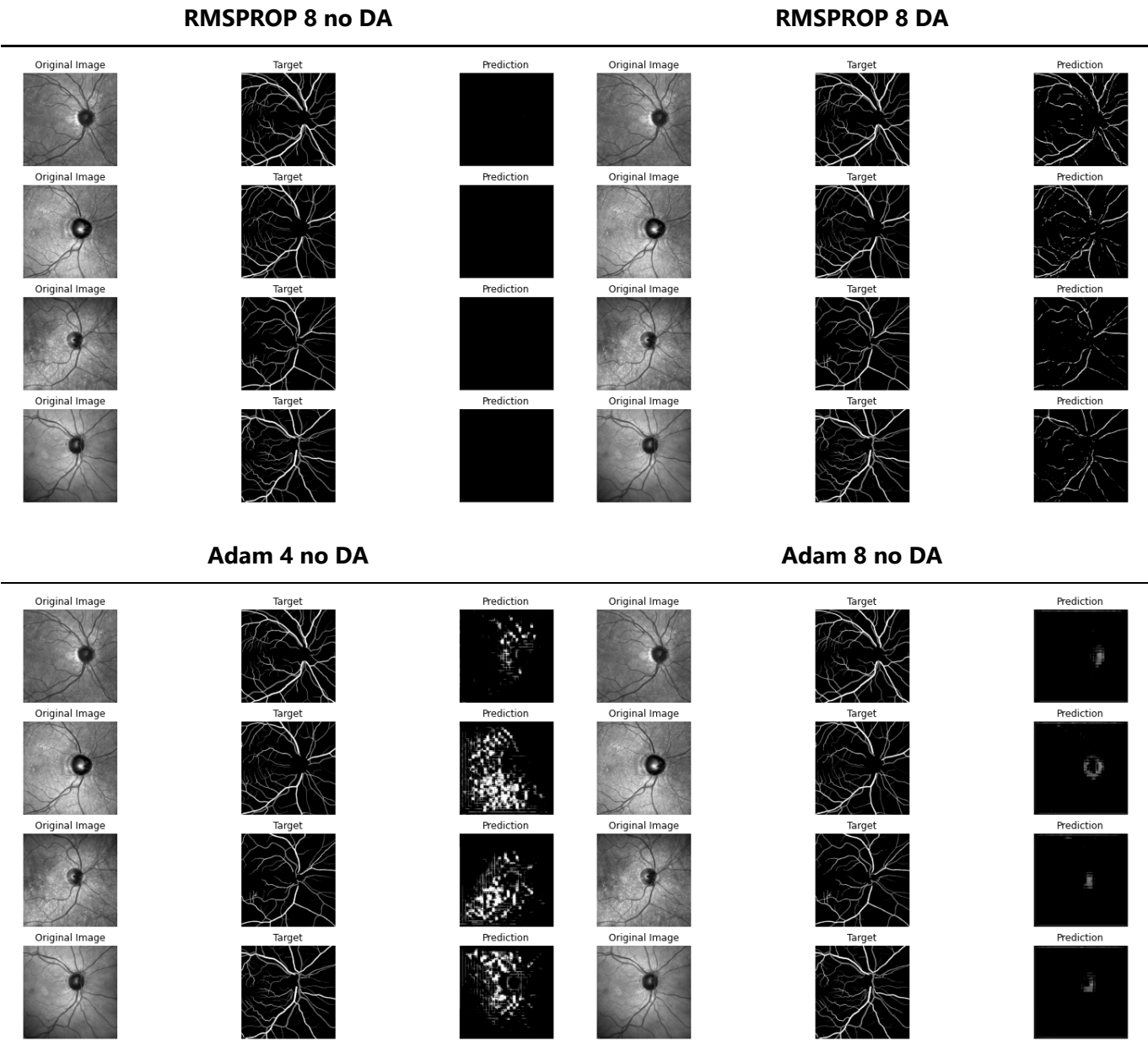


Metrics

Name	Sensitivity	Specificity	Accuracy	jaccard	dice_val
adam_bat4_15_epoc_noDA.h5	0.3907	0.665	0.6388	0.0876	0.159

Name	Sensitivity	Specificity	Accuracy	jaccard	dice_val
adam_bat8_15_epoc_noDA.h5	0.0009	0.9974	0.8998	0.0009	0.0019
adam_bat8_15_epoc_DA.h5	5.265e-05	0.999	0.9046	5.257e-05	0.0001
adam_bat16_15_epoc_DA.h5	0.0005	0.9998	0.9046	0.0005	0.001
rmsprop_bat4_15_epoch_noDA.h5	0.00039	0.9991	0.9018	0.00038	0.0007
rmsprop_bat8_15_epoc_noDA.h5	0.00138	0.9979	0.8999	0.0013	0.0027
rmsprop_bat8_15_epoch_DA.h5	0.278	0.997	0.929	0.269	0.4139
rmsprop_bat16_15_epoch_DA.h5	0.0007	0.999	0.903	0.0007	0.0014

Examples of results of predictions



Conclusions and future work

When I trained Unet with images I experimented with different parameters and I found that training with the same parameters again give me different results and in some cases a good results. One of the examples is RMSPROP 8 DA that predicts good the mask image. This was achieved training again a lot of times with same parameters so here we have a problem that is that the initial weights can affect to the results.

The main conclusion is that Unet it's not a good architecture for this challenge. I achieved a good results with RMSPROP 8 DA but the results are not good enough. I think that the problem is that the images are not enough to train the network. I think that the best solution is to use a network that is pretrained with a lot of images and then fine tune the network with the images of this challenge.