Project Report (June 30, 2021)

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ABSTRACT

We discuss progress on the fovea segmentation project. We also discuss updates of the dataset retrieval for Coudray's implementation on lung cancer detection project.

Fovea Segmentation

- We have trained the model on five datasets to perform binary segmentation where the model segments the fovea. Adding 3 more datasets since the last report.

  1. Drive: **40** images with ground truth

  2. Messidor: **180** images with ground truth

  3. IDRiD: **58** images with ground truth

  4. diaretdb0: **127** images with ground truth

  5. diaretdb1: **79** images with ground truth

- The dataset is **processed and formatted** so that it can be used for training effectively

- Major improvement that we observed with the **addition of new data** is **better training and validation metrics**.

- Our predictions initially were biased to predict all black masks, now it has **generalized** to segment fovea.

- Our **MIoU** for train and validation have reached as high as **0.92** and **0.84** for our best model respectively.

Training

- All the **hyperparameters** initialized are same as the last time.

- We train the **DeepLabV3+** model with **EfficientNet-B3** as the backbone. A sample prediction by the model is shown in **Figure 1**.

- We graphed the results based on the **loss**, **accuracy** and based on the metrics **MIoU** (Mean Intersection over Union).

- **Figure 2** shows our training progress using different learning rates **[1, 1e-2, 1e-4, 1e-6]**.

Coudray Data Update

- An issue was raised by us on **May 17** on the Coudray repo for dataset availability.

- We got a follow up on the issue on **June 25** and have a couple of discussions since.

- There are confirmed errors from the **TCGA site**, and the support team responded saying it will take couple weeks or a month to get the site working for the data retrieval.

- **Coudray** has agreed to upload the dataset that they have used for the paper implementation, and the details for the same are under discussion.
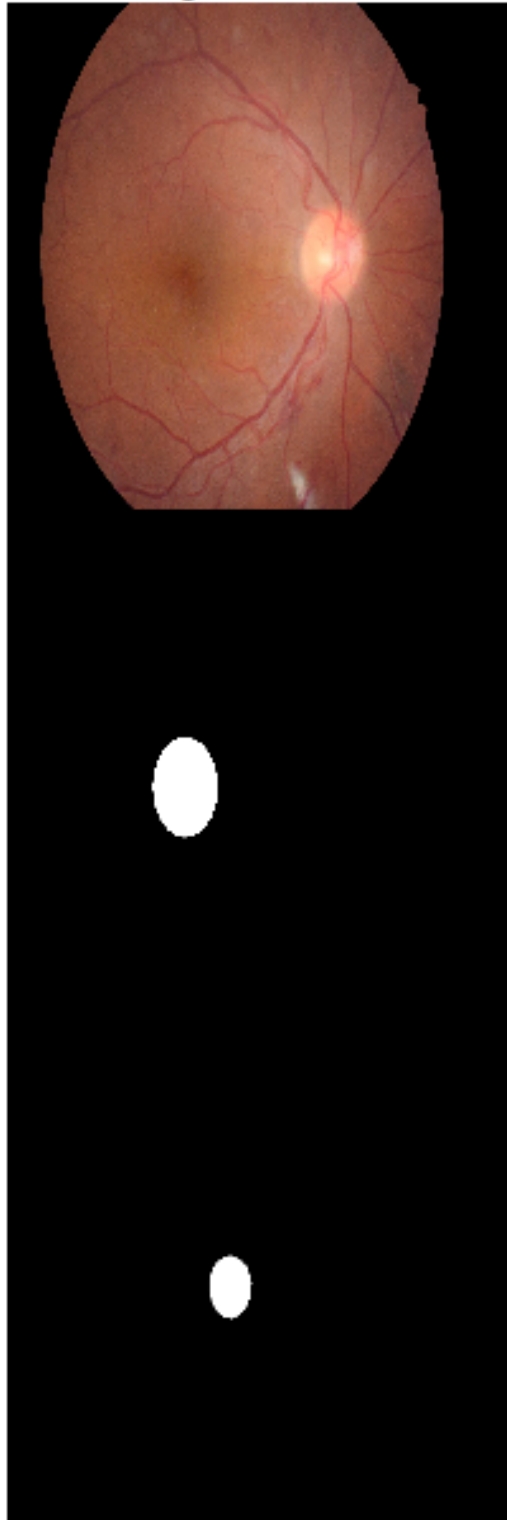
- GitHub Issue for the entire discussion

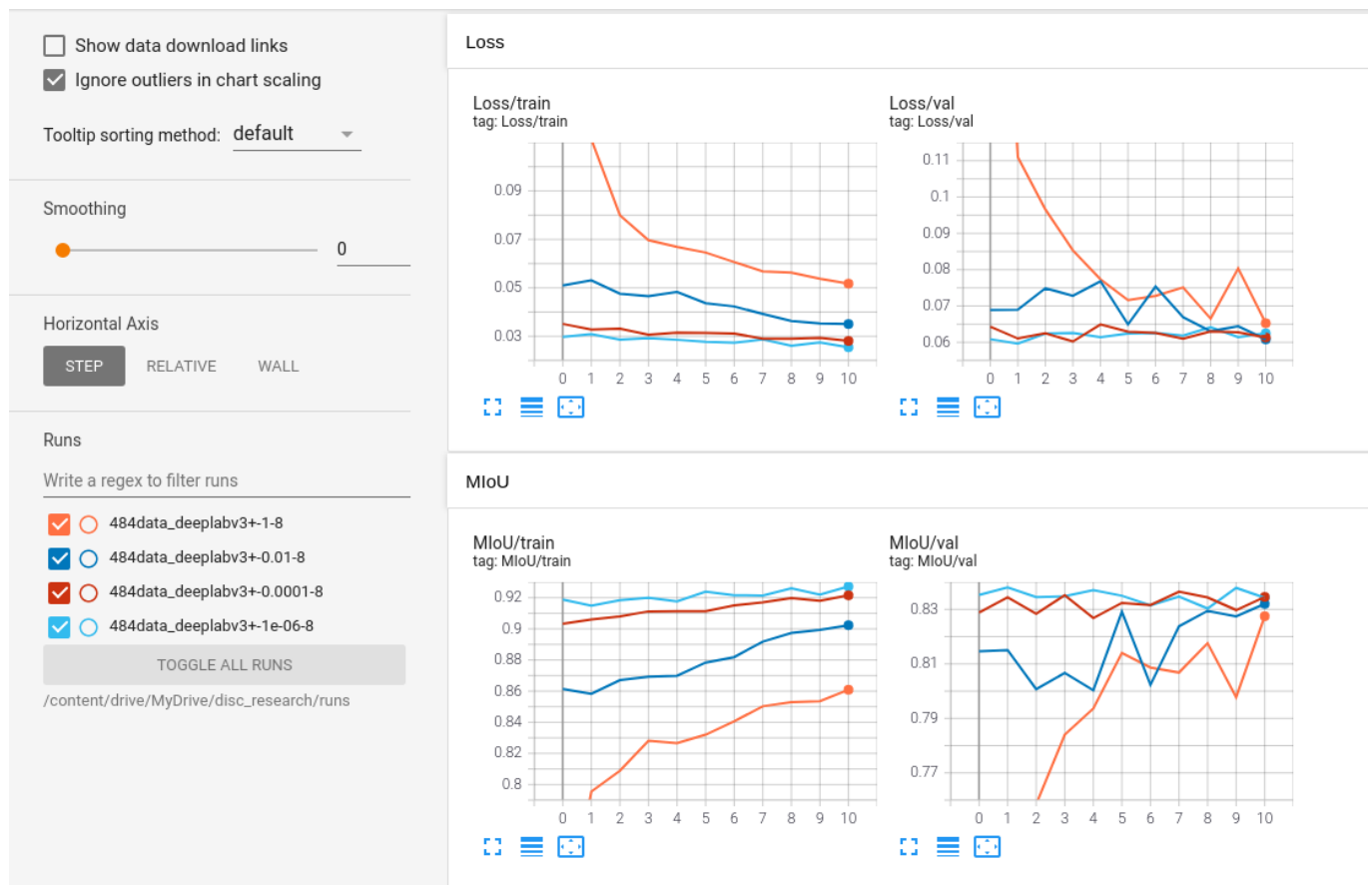**Figure 1.** Image, Ground Truth and Prediction (top to bottom respectively)

Figure 2. Training Progress

Discussion

- From the results we observe that the training is better as we **decrease the learning rate**. (best results with **1e-6**)

- Hence we will be training the model with **lower range** for learning rates in the next iterations to observe the results.

- We will also experiment with **different architectures and backbones** in the future iterations.

- We are also looking into **unsupervised methods** to use the **unlabelled dataset** available.

- As soon as we acccess to the coudray dataset, we will start experimenting on the implementation and try to **reproduce the benchmarks** that they have achieved in the paper.