Project Report (July 30, 2021)

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ABSTRACT

We discuss the progress on the fovea segmentation project after advancing our existing methodology for further improvement and update the metrics table with the new improved results. We are also closer to getting the dataset for our histopathology work.

Coudray Data Update

- Coudray has successfully transfered the dataset to another researcher.
- The researcher is in contact and has mentioned the data is **383 GB** and has transferred the data to a shared folder in the last 4 days, there are some details that we are figuring out about the download from our side.
- Hopefully we will have solved the data issue by our next report.
- GitHub Issue for the entire discussion

Fovea Segmentation

- We trained **15 models** with range for learning rates to observe the results.
- We graph and evaluate our results based on the **metrics**: Dice, Jaccard, Sensitivity, Specificity and Accuracy.
- **Table** 1 shows a comparison between our model and the other methods based on the metrics stated above.
- We have also mentioned the **improvement on metrics** as compared to the last best model from previous report.
- We added two more metrics which calculate Intersection over Union (IoU) for background (label 0) and fovea (label 1) individually:

  1. IoU for background (label 0): **0.9973**
  2. IoU for fovea (label 1): **0.7613**

Method	Dice(F1score)	Jaccard(MIoU)	Sensitivity	Specificity	Accuracy
Traditional Method (non-DL)	0.8044	0.6881	0.8162	**0.9984**	0.996
Deep Learning (ours)	**0.9537** (+5.5%)	**0.9335** (+10.2%)	**0.9981** (+17.67%)	0.9978 (+0.0%)	**0.9972** (+0.12%)
Deep Learning (Tan et al)	-	-	0.8853	0.9914	-
Deep Learning (Sedai et al)	0.81	-	-	-	-

Table 1. Metrics Comparison

DL papers for fovea segmentation

1. Paper 1: Tan et al
2. Paper 2: Sedai et al

Discussion

- We also looked into unsupervised techniques like **SimCLR-V2** by Google and are trying to collect unlabelled data to use these **self-supervised/semi-supervised** approaches that we have explored.
- 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.