**Progress Report Week 4**

**Group Name: X**

**Part 0: Semi-automatic segmentation of bugs with ITKsnap**

We segmented with ITKsnap a 3D image containing a mixture of bugs from BugNIST dataset. To this end, we used an active contours and region growing semi-automatic method. Figure 1 shows a 2D slice of the image segmented, and Figure 2 shows a 3D volume rendering of N segmented bugs, where each color represents a different bug. The volumes of the segmented bugs were: XX mm³ (color), XX mm³ (color), …

(FIGURE)

**Figure 1:** Provide an appropriate figure caption.

(FIGURE)

**Figure 2:** Provide an appropriate figure caption.

**Part 1: Extend a 2D CNN to 3D**

**1. Data**

After the full dataset was split into 70%-10%-20% training-validation-test sets, the training set contained X images, the validation set contained X images, and the test set contained X images.

**2. Model**

Last week’s 2D CNN was extended to 3D via the following changes: (fill this)

**3. Inference, Metrics, and Training the model**

Differently from last week, this week we measured not only the Dice coefficient between the predictions and the ground truth, but also the (metric2).

Since we are using a 3D model, the inference differs slightly from last week. Specifically, the code for inference (during validation) has changed in the following way: (explain). Afterwards, we trained the model for a few epochs to verify that the code runs. Figure 3 shows the plots of the training loss, validation dice coefficient, and validation (metric2).

(FIGURE)

**Figure 3:** Provide an appropriate figure caption.

**Part 2: Logging, batch jobs, and quantification**

**4. Hyper-parameter optimization**

After setting up weights and biases (W&B) and learning how to submit batch jobs to DTU’s cluster, we investigated the effect of certain hyper-parameters in the performance of our model. Specifically, we studied the following hyper-parameters: hyper-parameter1 (values: v1, v2, v3…), hyper-parameter2 (values: v1, v2, v3), …. According to the parallel coordinates plot that we obtained in wandb.ai (see Figure 4), the best-performing model had the following hyper-parameters: hyper-parameter1: value, hyper-parameter2: value, ...

(FIGURE)

**Figure 4:** Provide an appropriate figure caption.

**5. Quantification**

We segmented the images with the best-performing model to, afterwards, quantify the segmentations. Figure 5 shows a 3D image with the automated segmentation produced by our model. There, we can see that the left ventricle (label 1) has a volume of X mm³, the myocardium (label 2) has a volume of X mm³, and the right ventricle (label 3) has a volume of X mm³.

(FIGURE)

**Figure 5:** Provide an appropriate figure caption.

**6. Quantification (optional)**

Figure 6 shows a boxplot that illustrates the differences between the volumes of our predictions and the volumes the ground truth in the three classes.

(FIGURE)

**Figure 6:** Provide an appropriate figure caption.

(Add a few words about Figure 6. What can we conclude from it? Did the model produced accurate results? Discuss in a few lines)