**Progress Report Week 3**

**Group Name: X**

**Part 1: Cardiac MRI image segmentation. Data exploration, preprocessing, and data augmentation**

**1. Data exploration**

The subset of ACDC dataset that we use in these exercises contains X 3D images (X for training, X for validation, and X for test). Figure 1 shows one frame of a 3D image of this dataset and its corresponding segmentation that consists of X classes (X, X, X).

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

Although small, this dataset is heterogeneous. The image voxel resolutions ranges from min\_dim1 to max\_dim1 mm. (y-axis, first dimension), from min\_dim2 to max\_dim2 mm. (x-axis, second dimension), and from min\_dim3 to max\_dim3 mm. (z-axis, third dimension). The image sizes of the ranges from min\_dim1 to max\_dim1 voxels (y-axis, first dimension), from min\_dim2 to max\_dim2 voxels (x-axis, second dimension), and from min\_dim3 to max\_dim3 voxels (z-axis, third dimension).

**2. Preprocessing**

During training, we standardized the voxel resolution to (X, X, X) mm. with the *Spacingd* transform. (explain why you chose that voxel size/resolution). While the image is resized using bilinear interpolation, the label is resized using nearest neighbor interpolation. If, on the contrary, we use bilinear interpolation to resize the label, (explain what would happen).

During training, we standardized the image size to X x X x X voxels with *ResizeWithPadOrCrop*. This image size was chosen because (explain why you chose that image size).

**3. Data augmentation**

Since our training set is very small, we applied data augmentation. Specifically, we applied X transform with the parameters (parameters), X transform with the parameters (parameters), ...

Finally, since we trained a 2D network, we sampled random 2D patches from the 3D images with *RandSpatialCropd*.

**4. Combining all Data augmentation and preprocessing transforms**

After combining all the transforms, the images that will be fed into the neural network shown in Figure 2.

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

**Part 2: Training, Validation, and Inference**

**5. Training a neural network**

We optimized a model\_name with X loss function for X epochs and batch size of X. The optimization was done with X optimizer with a learning rate of X. During training, we keep track of two measurements: measurement1 that is computed at the end of every epoch, and measurement2 that is computed at validation time. The last measurement2 we computed at validation time was: (N values).

**6. Training and validation curves**

Figure 3 shows two plots: On the left, we observe that the measurement1 decreases over time, and, on the right, we observed that the measurement2 of each of the X classes increases over time.

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

**7. Inference at test time**

Finally, we evaluated our trained model on the test set, where we obtained a final average dice coefficient of (1 value).

**8. Visualize the results**

Figure 4 shows a few slices of the test set together with their corresponding labels and the predictions.

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