AI Fellowship Take Home Test

Task: 3D Segmentation Model on CT Abdomen Organs

Overview

In this task, you are required to build a 3D segmentation model for the segmentation of abdominal organs from CT scans. The primary goal is to segment the Liver, Right and Left Kidneys, and Spleen.

Dataset

You can download the dataset from the following link:
CT Abdomen Organ Segmentation Dataset

Classes and Labels

The dataset contains labels for various organs. You will need to focus on the following organs:

- **Liver**
- **Right Kidney**
- **Left Kidney**
- **Spleen**

Refer to the image below for the specific classes corresponding to these organs. The class IDs in this image should be correlated with the dataset to correctly identify the organs:
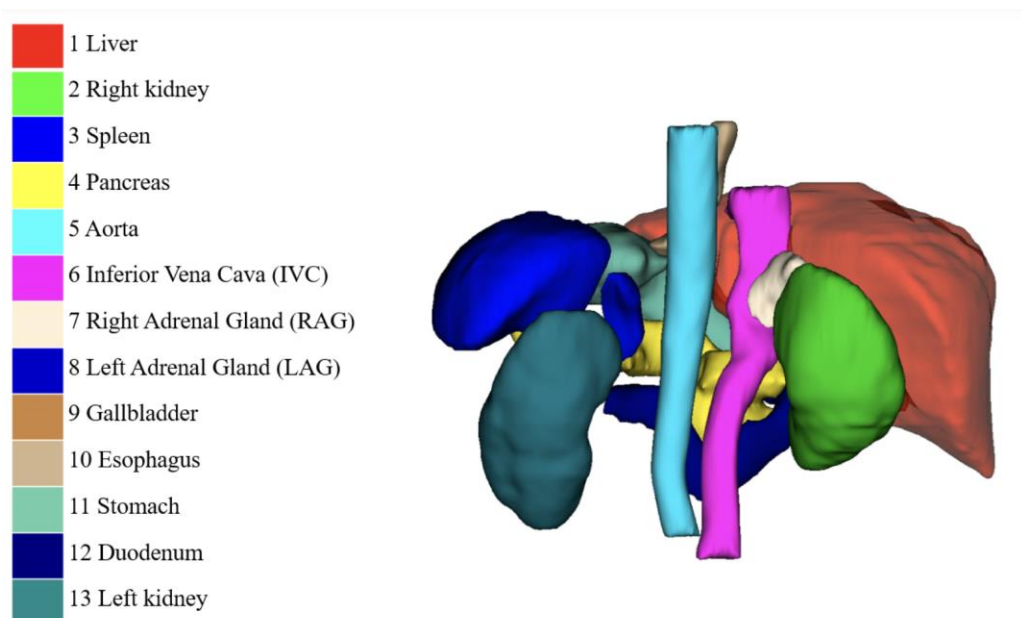
Model Development

1. **Model Architecture:**
   - Build a 3D segmentation model, preferably using VNet, to segment the Liver, Right Kidney, Left Kidney, and Spleen.
2. **Training:**
   - Train the model using the provided dataset.
   - Split the dataset appropriately, keeping a portion of the scans separate for validation/testing purposes.
3. **Validation and Inference:**
   - Evaluate the performance of the model using the Dice score, reporting the score for each organ separately.
   - Use the trained model to predict segments on the scans that were not included in the training set.

Submission Requirements

1. **Code Repository:**
   - Push all the code used to build, train, validate, and infer the model to a GitHub repository.
   - Ensure the repository has a well-structured and informative README file.
2. **README Section:**
   - **Overview:** A brief description of the project and its objectives.
   - **Setup Instructions:** Detailed steps on how to set up the environment and run the code.
   - **Model Architecture:** Description of the chosen 3D segmentation model (e.g., VNet), including key architectural details.
   - **Training Process:** Explanation of the training procedure, including data preprocessing steps.
   - **Validation and Inference:** Description of the validation and inference processes, including the Dice score calculation and other performance metrics used for each organ. But Dice Score is mandatory.
   - **3D Visualisation:** A video demonstrating the 3D rendered segments of the predicted organs.

Final Steps

Once completed, please ensure the following before submission:

- The GitHub repository link is shared with us.
- The README file contains all the necessary sections mentioned above.
- The 3D visualisation video is included in the README.