To Implement a Deep Learning Based Segmentation Model That is Capable of Identifying the Structures of The Fetal Transventricular Plane

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Author Note

Technologies Used: Google Colab using Python, TensorFlow and Keras

The dataset was provided by Origin Health Pvt. Ltd.

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Report

Dataset : Dataset was provided by Origin Health.ai. The dataset consisted of 60 images and their corresponding masks in the “train” folder,10 images with masks in the “val” folder and 13 images in the “test” folder.The masks had 6 classes.

Model: Since the masks had 6 classes including the background the problem was of the class of “Multiclass” segmentation.For the task U-Net architecture was chosen as it is the one of the predominant segmentation algorithms for medical image segmentation.At first the model was implemented without augmenting the dataset.Metrics was chosen as “Dice Coefficient” for generating results and “IOU” for experimentation.After 50 epochs the model achieved a validation dice coefficient of 0.93 , after 100 epochs it had the value 0.94 and after 200 epochs it achieved a validation dice coefficient of 0.97. The model was applied on the test images to observe the results. Then the encoder part of the U-Net architecture was replaced with VGG16,ResNet 34 and Inception V3 Base Model with weights taken from Imagenet competition, and it achieved a validation score of 0.87, 0.94, 0.98 respectively after 100 epochs. And finally the Model was applied after augmenting the images which had a validation dice coefficient of 0.88.

Inference: Although U-Net with Inception V3 backbone showed the best results, due to the size of the model it is not efficient for industrial deployment.Result is shown using U-Net.