Kidney Semantic Segmentation using U-Net

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May 14, 2022

1 Introduction

hello

2 Methods and Materials

hello

3 Results

hello

Models	Train Acc.	Train Spec.	Train PPV	Train NPV	
2D Classification	0.9315	0.8616	**1.0000**	**1.0000**	0.8804
2D Segmentation	0.7383	0.4717	**1.0000**	**1.0000**	0.6585
2D Custom Classification	**0.9502**	**0.8994**	**1.0000**	**1.0000**	**0.9101**

Table 1: Statistics for Training Test Set

Note that during training, the specificity and positive predictive value for all three models are synonymous. Overall, the 2D custom classification model performed most optimal with a validation accuracy of

Models	Valid Acc.	Valid Spec.	Valid PPV	Valid NPV	
2D Classification	0.6296	**0.4681**	0.8529	0.8148	0.5370
2D Segmentation	0.5802	0.3191	0.9412	**0.8824**	0.5000
2D Custom Classification	**0.6420**	**0.4681**	0.8824	0.8462	**0.5455**

Table 2: Statistics for Validation Test Set

4 Discussion

The results were not expected because I hypothesized that the custom model would be best in performance. The biggest difference between the three different algorithms is the input dimensionality. The Squeeze and Excite model was given 2 dimensional data (1 x 96 x 96), therefore we cannot say how well it would perform on 96 x 96 x 96 images. I chose the Squeeze and Excite model due to its scalability in terms of feature maps. It would be interesting to experiment on 3D images for the custom model for future work.

References

[1] "The 2021 Kidney Tumor Segmentation Challenge." *Kits21*, kits21.kits-challenge.org. Accessed 5 May 2022.

[2] "U-Net." *Wikipedia*, 3 Aug. 2020, en.wikipedia.org/wiki/U-Net. Accessed 5 May 2022.

[3] Hu, Jie, et al. "Squeeze-And-Excitation Networks." ArXiv:1709.01507, 16 May 2019, arxiv.org/abs/1709.01507. Accessed 5 May 2022.