MRI Fusion Guided Biopsy for Prostate Cancer

BMIF804 - Mini Project

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August 7th, 2021

Part A: Segmentation of prostate in T2 weighted MR images

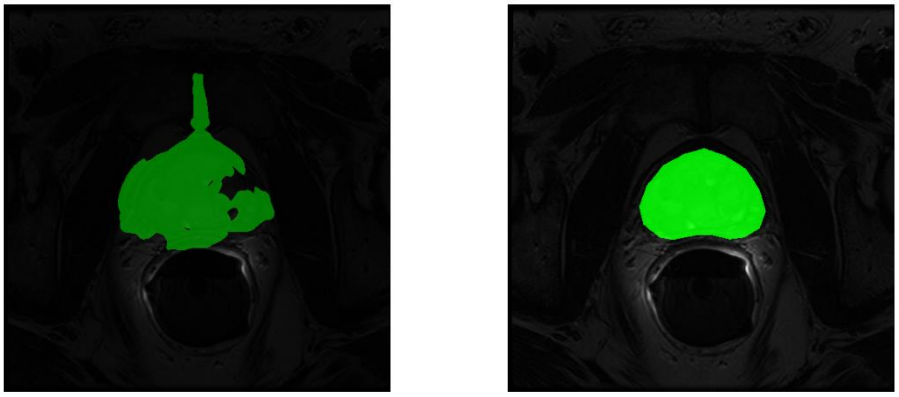

Figure 1. Left - Image of created segment using seed points from 3D slicer over MRI image.

Right - Image of given segment over MRI image

Part B: Evaluation of segmentation

The dice similarity coefficient that was calculate when evaluating the created segmentation to the one provided was: **0.6187**. The Soernsen-Dice coefficient is a statistical method used to determine the level of similarity between two segments. The values for this method range from 0 to 1, where 1 has the greatest similarity between both segments. The value obtained from this evaluation demonstrates a 62% similarity score. This is a promising result as both images do show some similarities between segments; however, with these images being utilized in the medical field, the score must be higher (2).

The Hausdorff distance method for segmentation evaluation yielded a value of **31.44** when evaluating both similarities of the created segmentation against the provided segment. The Hausdorff distance how far a subset of segmentations is from each other on a base image. A strong evaluation of segments is when the Hausdorff distance is minimized. As shown qualitatively though the images have features of which the segments overlap, there are still differences. As a result of this, the Hausdorff distance value is higher (1).

Part C: Determine Biopsy Location

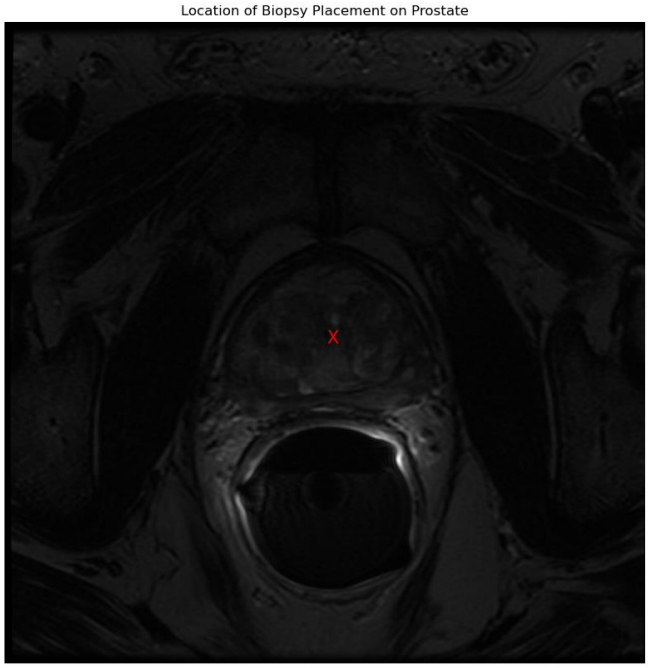

Figure 2. Location of Biopsy Placement on Prostate. Red X represents the best placement for biopsy on this patient's prostate.

Part D: Extract tissue properties for post biopsy analysis

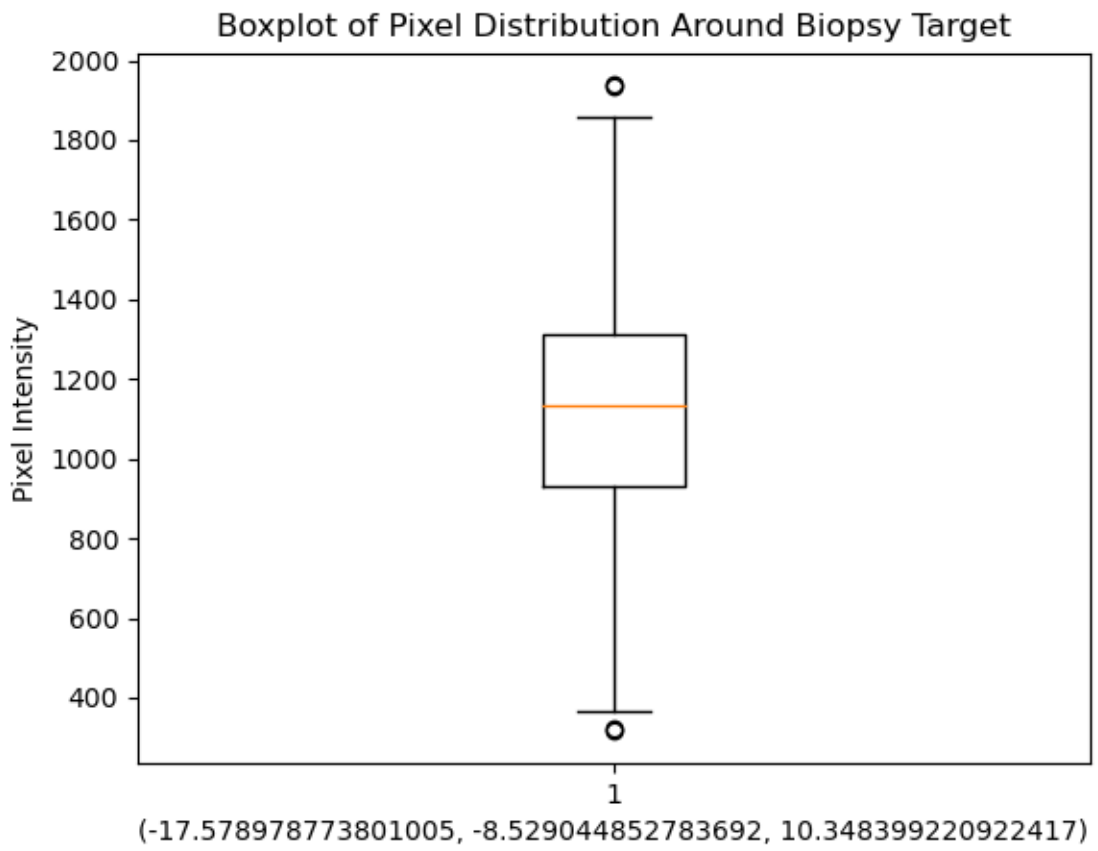

Figure 3. Boxplot of pixel distribution around biopsy targeted area.

References

1. Aydin, O.U., Taha, A.A., Hilbert, A. *et al.* On the usage of average Hausdorff distance for segmentation performance assessment: hidden error when used for ranking. *Eur Radiol Exp* **5,** 4 (2021). https://doi.org/10.1186/s41747-020-00200-2
2. https://towardsdatascience.com/metrics-to-evaluate-your-semantic-segmentation-model-6bcb99639aa2