Classifying Cancer Grades Using Temporal Ultrasound for Transrectal Prostate Biopsy

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Introduction

Transrectal Ultrasound (TRUS)

Systematic Biopsy

MRI/TRUS Fusion Biopsy

Objective: Differentiating aggressive prostate cancer from clinically less significant disease and non-cancerous tissue using temporal enhance ultrasound.

Material and Methods

We divide the data from 197 biopsy cores into training and testing sets. Training data consists of 32 biopsy cores (27 patients) and the test data is made up of 165 cores (114 patients).

Results

Figure 4. Cancer probability maps overlaid on TRUS images. ROIs detected as aggressive, clinically less significant disease [4] and non-cancerous are red, yellow and blue, respectively. Segmented prostate boundary from MRI is projected on TRUS coordinates.

Discussion

- In an in vivo study including 197 TRUS-guided biopsy cores, using temporal enhanced US an AUC of 0.80 for separating aggressive cancer from benign tissue in large tumors is achieved.
- Temporal enhanced US combined with mp-MRI has the potential to have the potential to outperform either modality alone in detection of PCa, hence, reduce the number of unnecessary biopsies.
- Limitations: (i) Training DBN is computationally expensive; (ii) temporal enhanced ultrasound is only acquired from MR-positive tumors.

Conclusion

- Performance for classification of cores in the test dataset and permutation set for cores with the length of tumor in MRI ≥ 2 cm.

References