# Automatic Segmentation Method to Improve Prostate Cancer Imaging

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## Technology description

Market Summary

An estimated 1.5 million prostate biopsies are performed on men each year. To date, 2D transrectal ultrasound (TRUS) guided biopsy has been the clinical standard for prostate cancer diagnosis. 2D image partitioning is limited in its ability to extract texture features of the geometrical shape and boundaries of the prostate. Using the 2D image from the TRUS, the physician must estimate the location of the biopsy needle based on the 2D information. A conventional biopsy can miss up to 30% of cancers, which is likely due to the "blind" sampling. Early diagnosis of prostate cancer results in increased survival, improved image quality would improve prognosis of patients. Compared to 2D prostate segmentation, 3D imaging segmentation and clustering would create more meaningful images that are easier to combine with other images, analyze, and use for targeted biopsies.

**Technical Summary**

To create 3D reconstructions of segmented TRUS images, Emory researchers use Wavelet-based support vector machines, or W-SVMs, and a classification algorithm to analyze the prostate in 3 planes: sagittal, coronal and transverse, then define features, boundaries, lines and curves of the human prostate. These machines are able to differentiate prostate from non-prostate tissue due to texture matching capabilities upon image segmentation. Even if the prostate appeared diverse in different parts or if the boundaries are weak near the bladder and/or rectum, the generated images are still able to provide information for an accurate assessment of the prostate volume, texture, contours, shape, and borders. This new method of image modification, which creates a 3D representation of the prostate based on enhanced segmentation and image registration, can be used to optimize TRUS-guided prostate biopsy and thus provide a more accurate assessment of the grade and stage of the disease.

## Application area

An automatic method for image segmentation in prostate cancer detection and diagnosis.

## Advantages

Optimizes prostate biopsy by providing a method for 3D TRUS imaging that can be used in the diagnosis, staging, and monitoring of prostate cancer.

## Institution

Emory University

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