Concepts of medical image post-processing
MSC EVA

Management and Post-Processing
of Prostate MRI

Programming in Matlab

Presentation

Adenocarcinoma of the prostate appears in older men. It appears before an age of 50. 85% of cases are diagnosed in men over 60 years. Prostate cancer is a common cancer whose the incidence and mortality are now steadily increasing (85,000 new cases per year in Europe). It is the second most common cancer after lung cancer and the third leading cause of cancer death in men (9% of all cancer deaths in men in Europe). Currently, there are four anatomically glandular areas within the prostate:

  - Peripherical zone (ZP)

  - Central zone (ZC)

  - Transition zone (ZT)

  - Anterior Fibromuscular Tissue (AFT)
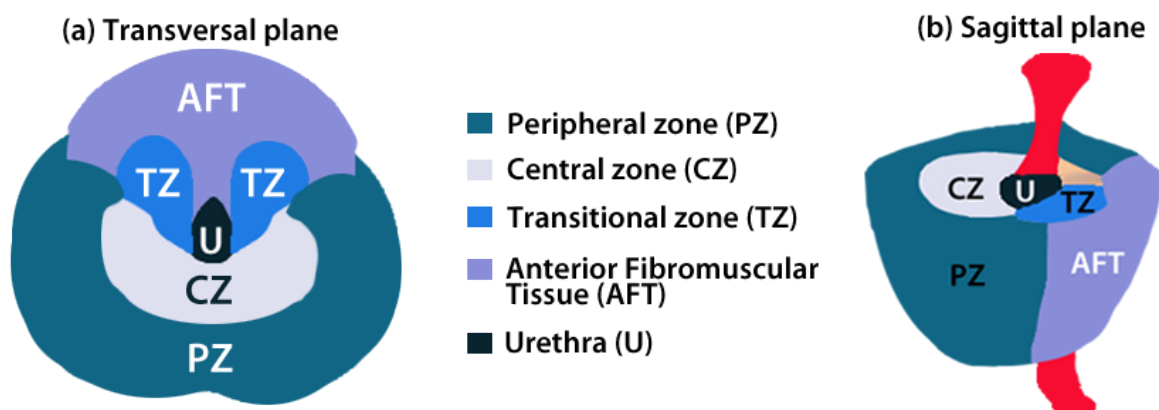
Anatomy of the prostate in transversal and sagittal plane

Adenocarcinoma arises in 75% of cases in the ZP, in 20% of cases in the ZT and in 5% of cases in the ZC.

Diagnostic

The Magnetic Resonance Imaging (MRI) provides high-resolution images in all planes of space, allowing precise anatomical visualization of the prostate. MRI of prostate cancer benefits from technological advances that expand more indications. MRI is a valuable tool to guide therapeutic management of prostate cancer through acquisition sequences as follows:

- **Anatomical imaging**– *3D - T2 weighted imaging*
- **Diffusion imaging** – *ADC (Apparent Diffusion Coefficient)*
- **Perfusion imaging** –*DCE (Dynamic Contrast Enhancement)* (Observation from signal-intensity time curve)
- **Spectroscopy**

Work

You should develop an interface GUI in MATLAB for:

1st Stage

- Display the information of DICOM (PatientName, PatientID, PatientBirthDate, StudyID, StudyDate, SliceLocation, InstanceNumber)
- Anonymize DICOM images: Modify the following fields (PatientName, PatientID, and BirthDate) for all the set of images
- Save the anonymized images (Create a new folder containing the new anonymized images)
- Convert the DICOM image in JPG format (Be careful with the DICOM information!)
- Convert the JPG image into DICOM format

<u>2nd stage</u>

- Manual segmentation for each region (only ZP, ZT, ZC, and the tumor region).

- Show a 3D representation of the prostate gland. (all the prostate)

- Show a 3D representation for PZ and CZ

- Show a 3D representation of the tumor region.

* For the 3D representation should do using a transparence system.

<u>3rd stage</u>

- For each region calculate the surface (Surface = number of pixels x spatial resolution)

- Calculate the volume for each region.

* In order to calculate the surface and volume you should use the DICOM information. Concretely, it must use the field PixelSpacing for the surface. And, for the volume is need to use the SliceThickness Tag.

<u>Shedule</u>

- 1st stage   ~=   **4h**
- 2nd stage   ~=   **6h**
- 3rd stage   ~=   **6h**

<u>Evaluation</u>

Make a ZIP file containing:

- **<u>Matlab code</u>**

- **<u>Report</u>**

Send   to   **Christian.Mata-Miquel@u-bourgogne.fr**   and   **alain.lalande@u-bourgogne.fr**

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