Interactive Web-Based Application for Prostate Annotation in MRI

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Abstract— **Over the past decades, medical imaging technologies have begun to play an essential role in the health care system. Web-based application frameworks are used as powerful diagnosis tools to guide decision making on treatments and tests. In this sense, a web-based application in order to manage DICOM databases and facilitates the diagnosis of prostate cases is presented. This application provides a set of image processing tools that allow a better visualization of the images, and a set of drawing tools used to annotate image regions.**

I. INTRODUCTION

Prostate cancer is the second most common cancer and the fifth leading cause of cancer death among men in the past year [1]. Nevertheless, during the last decades the death rate has notably decreased mostly as a result of an early diagnosis and an improvement on the tools used to perform it. Traditionally in the study of this cancer, radiologists analyze different imaging modalities individually. In this way, we can find cases in which the observation of the tumour can be compromised by different aspects and may not be detected correctly. For this reason, our goal is to develop an accessible application for any medical centre or hospital, without the need for a complex software installation, to help diagnosing prostate cancer and to provide a solution for these limitations.

II. PROJECT FRAMEWORK

ProstateAnnotation is a web-based application in order to manage medical imaging databases and to allow a complete analysis of a prostate study is implemented (Figure 1). A graphical interface allows comparing regions of interest such as central zone, peripheral zone, transition zone and tumour region at the same time in order to diagnose pathologies or lesions. Hence, three different MRI techniques will be used: 3D T2-Weighted Imaging (T2WI), Diffusion-Weighted Imaging (DWI) and Perfusion-weighted imaging (DCE) [2]. Besides, this medical tool enables collaborative work between experts.

It is divided into three different functional parts. The first one (a) refers to the Patient information, contained in the DICOM file. It consists of a dropdown to choose a patient within the database and a table displaying the information. Then, part (b) consists in the image visor. The three different MRI techniques are shown simultaneously. Below it, there is a selection of filters that can be applied to each image. Furthermore, at the bottom there are two buttons to move forward or backward within the series of images. In case of Perfusion Imaging, you can also find a dropdown to select between space. The last part (c) refers to the annotation system being the main functionality. In the dropdown you can choose the zone where the annotation is going to be made. Coordinates of the annotations are shown in the table and can be exported by clicking the "export" button. Finally, in the bottom part this exported annotations can be posteriorly loaded by clicking or dropping the file there.
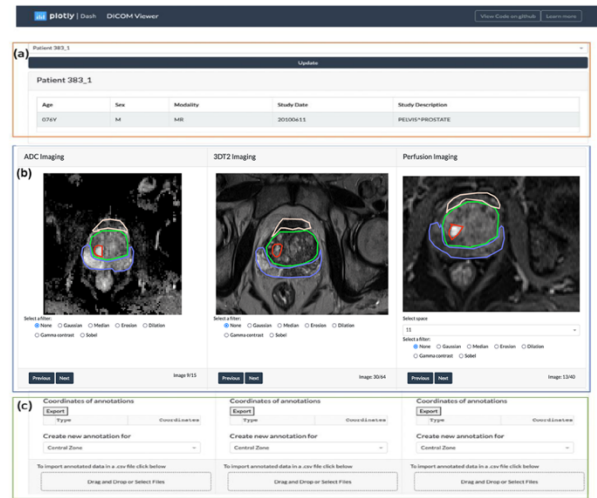

Figure 1. Graphical Interface of the ProstateAnnotation Web-based Application

One of the advantages is that no need to install any compiler, library or complicated system framework to be executed. The application is uploaded to a Docker Hub where it can be downloaded and executed using a browser [3].

REFERENCES

[1] H. Ferlay et al. "Global Cancer Statistics 2020: GLOBOCAN Estmates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, 71(3), 209-249.

[2] C. Mata, *Web-based application for medical imaging management.* PhD thesis, 2015.

[3] J. Romagosa and C. Mata, *DICOM viewer, DockerHub.* 2021. https://hub.docker.com/r/juliaromagosa/dicom-viewer

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