MI4Web Abstract Report

Informatics Project
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Nowadays, the zero-footprint fully web-based visualization is making its way and gaining wider acceptance within the medical imaging community. Since the level of acceptance is growing up, the necessity of upgrading and building new functionalities and features is mandatory, so that it can continue to gain recognition and grow. One of these applications is OHIF, a zero-footprint, open source and web-based medical imaging viewer, that gives us the ability to add and configure extensions, which makes it very expandable. Therefore , this platform will be the starting point of our project.

Even though OHIF already has a lot of functionalities, it would be helpful for the healthcare professionals to have some additional features such as:
- Basic transactions for medical image storage and retrieval ;
- DICOM import and export;
- Multiplanar image display functionalities;
- 3D Display tools as VTK plugins;
- Image Annotation Edition and Storage;
- Creation of Medical Reports;
- Admin Interface to manage the application equipment and the access.

Overall, our main goal is to develop these new features and new interfaces.

In order to improve the usability of OHIF, we decided to create four different actors with different permissions levels: the guest are users of the system that are not logged in, therefore they have the access to the same features as the referring imaging staff, although they only have access to a reduced number of studies; the Clinical Imaging Staff has permissions to check medical images from patients, meaning that it is an authenticated user in the web server, that has full access and full permissions to access images and create annotations on those images and create reports; the Referring Imaging Staff has the same features as the Guest user although has access to all medical images and the last is the System Manager, an administrator of the system that has an interface to manage the application software and the user permissions.

In order to get studies of medical images available on our website, we used the medical image archive "The Cancer Imaging Archive (TCIA)" https://www.cancerimagingarchive.ne to have access to the studies. Then, using the NBIA data retriever application we downloaded the studies, consequently we used ORTHANC to upload the studies to the server.

Our application has a feature that allows the users to see Multiplanar Synchronization, this component allows you to simultaneously analyze the three different views (Axial, Sagittal and Coronal) and when you interact with a view using either the colored lines or the circles all the other views change synchronously. In this feature it is possible to use MIP and MinIP in order to see hyperdense and hypodense structures, respectively.

Also, our application allows you to view 3D images where you can zoom and rotate. You can apply one of several transfer functions available, in order to see different types of organs and structures of the human body like: the lungs, the fat tissue, the bones. Furthermore, it's possible to edit the opacity function interactively through multiple Gaussian functions. It is possible to change the colors to find the best view.

In order to help the management of the application software and the user permissions we decided to create an admin dashboard and new features, such as, management of the user access levels, a dashboard to analyze important information about the ORTHANC server, a tool to examine the relevant information about the DICOM nodes, and the possibility to check viewer extensions and see their status.

Moreover, the Clinical Imaging Staff can write reports about the medical images studies, the interface for this functionality has the fields for the user to fill, and using them it creates a structured medical report in pdf format. Subsequently the reports can be viewed by the Referring Imaging Staff. Using this way, it is more simple for the Referring Imaging Staff to see the files associated with this study and download them.

Also in our viewer it is possible to make annotations and measurements in the DICOM images and save them in our system if you have the right permissions.

In conclusion, when we started working on this project our main goals were to enrich the OHIF platform, add new features and interfaces in order to help healthcare professionals.
The zero-footprint fully web-based medical imaging networked platform was thus implemented as our main goals were completed and all the main features are working.