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Title:
Orthanc - Lightweight, Scriptable DICOM Server for Medical Image Management in Radiotherapy
Abstract Text:
Purpose/Objective
High-quality radiotherapy (RT) treatment planning requires the combination of information arising from multiple medical imaging modalities. For this reason, RT implies the setup and the management of complex flows of images between the various modalities and software of the hospital. Even though biomedical images are most commonly stored and transferred using the DICOM standard, it remains hard to automatize and optimize these clinical flows that are very specific to each hospital. This stems from the fact that programming the DICOM network protocol requires both a high level of familiarity with the DICOM standard as well as substantial experience in computer programming. This motivates the introduction of the Orthanc software in the medical practice to improve the RT imaging workflow.
Materials and Methods
Orthanc is an open-source, easy-to-use, lightweight and scriptable DICOM store. It takes advantage of the DCMTK toolkit for powerful DICOM handling abilities. Multiple instances of Orthanc can be easily and freely deployed in the hospital network. Orthanc comes bundled with an embedded Web interface that allows the end-users to browse and interact with the content of the DICOM store from any computer. Orthanc can be setup as a bridge between multiple DICOM modalities, which improves the

interoperability between proprietary systems by decoupling them. Furthermore, Orthanc features a rich scripting environment: It can be driven from any computer language to automate and optimize clinical processes. Orthanc is written in C++ for maximum speed, and emphasis is put on the quality and the automated validation of its source code.
Results
Orthanc is currently used in our Institution to improve two real-world clinical processes. Firstly, Orthanc is deployed as a buffer for PET scans between Nuclear Medicine (NM) and RT departments. These images are indeed systematically purged from the Treatment Planning System (TPS) on a daily basis. Orthanc enables the RT physicists to immediately find the purged images and restore them back from Orthanc into the TPS on the fly, without any interaction with the NM team, hence accelerating the clinical processes. Secondly, another instance of Orthanc is configured to gather the in-room images that are produced during the RT treatments. This opens the path to the automated assessment of the quality of the patient positioning and to the clinical research about adaptive radiotherapy in our hospital.
Conclusions
The open-source Orthanc software provides medical physicists with a powerful environment to make the image flows more robust and automated in RT departments.
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