

Abstract

The medical infrastructure as well as the familiar workflow within clinical environments has changed dramatically throughout the last few years. Currently the trend points towards a completely paperless workflow.

At the same time many new medical imaging methods have been introduced. Today it is common for a modern hospital to be equipped with at least some X-ray equipment, a Computed tomography (CT), a Magnetic resonance imaging (MRI) and a positron emission tomography (PET). Apart from these methods digital information is continuously acquired by using digital cameras or scanners as well.

Therefore worldwide many different vendors are busy developing multimedia archives that are capable of storing, querying and displaying any kind of information mentioned above. In addition many of these solutions are implemented as modern web applications, which provide accessibility from any kind of modern computer without the need to install additional pieces of software.

Digital Imaging and Communications in Medicine (DICOM) is a standard for storing, handling, transmitting and printing information in the area of medical imaging. Further on it includes a file format definition whose aim is to store all data concerning medical imaging in one standardized format. Although DICOM has made its mark in the health care environment it is neither known nor used in any other computational domain.

This raises a serious problem. On one hand all medical images are stored as standardized DICOM files, on the other hand they cannot be viewed or altered without the help of additional third-party software. Unfortunately support for DICOM files is not an issue in modern operating systems as it is no widespread standard.

Of course the installation of complementary third-party applications to display DICOM files is no option for any web-based archiving solution that claims to be independent of additional software except from a state-of-the-art web browser. In the majority of the cases this web browser is included in the operating system. Therefore the only solution to this demanding problem consists in the creation of a web-based component that can be distributed over the network, that requires no installation and – of highest importance – that is able to display DICOM files.

The majority of this thesis deals with designing and implementing a prototype of a component that allows the display of DICOM files within a web browser. This web-based component has to follow strict guidelines in order to ensure a high level of integration into an existing medical IT infrastructure. The main requirements are the ability to be runnable within a modern web browser, without any kind of installation. Moreover the development of this component demands to contribute only third-party libraries that are available for free and are therefore released under the GNU General Public License. Moreover, an in-depth analysis of the available open source DICOM libraries, revealing their ad- and disadvantages, provides a good overview on the current market situation.

With the help of this component the multimedia archive DOMAIN is now capable of displaying DICOM files that are stored locally – inside the archive itself – or within any Picture Archiving and Communications System that is connected to DOMAIN.

Last but not least the critical, in-depth examination of the developed component provides several approaches for further improvements and additional suggestions on possible areas of application, besides the primary goal – the display of DICOM files.

By all means, the main goal of this thesis is the implementation of a web-based DICOM-Viewing prototype for the multimedia archive DOMAIN that will help to optimize the existing clinical workflow.