DIZH Projekt: Modulare Open Source Plattform für medizinische Bilddaten

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Abstract

Radiological image data represent one of the foundations of medical diagnostics in clinical routine. The DICOM (Digital Imaging and Communications in Medicine) standard was introduced to ensure interoperability between the various modalities (e.g., computed tomography (CT), magnetic resonance imaging (MRI), or positron emission tomography (PET)) and the devices of different manufacturers. This standard not only regulates the format in which the raw image data is stored by each system, but also specifies, for example, how the images are to be sent within a network. Due to the conformity of practically all image-generating large medical devices of different manufacturers to this standard, the generated images can be stored centrally in a PACS (Picture Archiving and Communication System) and retrieved from different workstations for diagnosis or demonstration.

Unfortunately, the clinical PACS systems are not expandable. Therefore, all new research approaches must be implemented separately, and the raw image data must be transferred to the individual system in a cumbersome manner. This leads to multiple redundant implementations of identical functionality at different points in the network and prevents or at least delays the rapid integration of new techniques.

This project aims to develop an open-source modular platform for medical image data, allowing both the distribution of image data in the network and the seamless integration of modules for further image processing and analysis. This allows the targeted implementation of innovative approaches as modules within the platform - without requiring developers to spend time on image transfer, result output, or general data management, as this is handled entirely by the platform. This massively reduces development time and the effort required to deploy and configure an innovation.

The main component of the platform is a dynamic set of rules which, based on the DICOM information (so-called "DICOM tags", e.g., patient information, modality, image information, study description, etc.), makes the data available to a module or also initiates the forwarding of the image data to a specific destination in the network. The results returned by the modules become part of the control system. They can thus dynamically and efficiently control the data flow (e.g., marking of studies with suspicious pulmonary nodules by artificial intelligence --> automatic forwarding to a specific workstation in case of positive findings --> additional e-mail about positive findings to specific physician). This also enables the combination of several technically independent approaches for complex questions.