Automated Containerized Medical Image Processing Based on MITK and Python

A Modular System to Implement Medical Image Processing Pipelines and Visualize Meta Data

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Modern medical image processing employs an ever widening array of tools on an ever larger pool of data. Development of the tools takes place on a variety of different platforms, determined by external circumstances, such as the availability of necessary functionality as libraries forcing the use of a specific programming language or interdependencies of third party tools requiring specific versions of specific operating systems. This problem itself is not unique to medical imaging[1] and solutions such as Docker¹ have proven themselves useful in a variety of use cases. It enables a very modularized approach to image processing where each step of a pipeline is isolated from the others. We will present a containerized pipeline of modular image processing steps, partly based on the Slicer execution model as implemented by MITK[2], partly based on research software written in Python, that enables us to easily import new versions of rapidly developing tools from the developer. Managing and understanding large amounts of patient data to identify relevant patient pools for a given research question is required for efficient research. We will show equally containerized visualization tools that enable us to parse the meta data as provided by the DICOM images, make it searchable and provide a quick and easy way to interact with it using Elasticsearch² and Kibana³

References

1. Gil Y, Deelman E, Ellisman M, et al. Examining the challenges of scientific workflows. *Computer*;40(12):24–32.
2. Nolden M, Zelzer S, Seitel A, et al. The medical imaging interaction toolkit: challenges and advances. *International Journal of Computer Assisted Radiology and Surgery*. 2013;8(4):607–620.

¹ <https://www.docker.com/>

² <https://www.elastic.co/products/elasticsearch>

³ <https://www.elastic.co/products/kibana>