

A framework to provide the distributed execution of semantic and image analysis algorithms on different platforms and architectures

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Motivation:

In histological image analysis a wide range of different image analysis frameworks has been used over the years. These platforms and technologies for analyzing images use, e.g., different languages and concepts and each has specific strengths and drawbacks. This becomes even more complex when technologies for semantic analysis are combined with native image analysis approaches. Finding the right platform which fits predetermined needs can be a time-consuming task and carries the risk of wrong decisions. It is also eminently challenging to group researchers with different skills in different platform in one project. Thus a lot of time and effort is wasted finding the right way to work together while it would be more worth using anyone's specific strengths.

Materials and Methods:

The developed platform offers a distributed approach to combine different image analysis platforms in one common system. Thus, the development of image analysis algorithms can be conducted over different systems using their specific strengths.

As an example we integrated three completely different frameworks. ImageJ [1], a Java-based, open source image analysis platform. ITK [2] a segmentation and analysis framework written in C. Furthermore, we integrated Definiens Developer XD [3], a commercial UI based system for developing segmentation and classification algorithms.

To accomplish this, the framework uses a web-based XML protocol which allows platform independent communication between the components of the system. Using a single entry point every client in the system can access all provided algorithm without detailed knowledge about their implementation. Thus, the system allows cross-developing on different systems and frameworks.

Results:

The developed framework provides an easy and coherent access to different image analysis platforms which can be used to gain advantage from any specific platform. Due to the distributed nature of the system tasks can be performed at different locations. With the provided approach it is even possible to exchange an existing implementation of an algorithm with its complement from another platform. New frameworks can also be added easily to the system to use additional image analysis algorithms.

Conclusions:

We developed a platform that combines different basic image analysis algorithms. It should be noted that this platform holds the potential to be used in even more complex scenarios. Currently, the platform will be extended to provide semantic support for image analysis.

Keywords:

Distributed image processing, Definiens, ImageJ, ITK, semantic image analysis

[1] <http://rsbweb.nih.gov/ij/>

[2] <http://www.itk.org/>

[3] <http://www.definiens.com/>