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A Scientific Gateway for Distributed Mining of Biomedical Image Data utilizing Web Services

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Recent advances in biomedical applications like DNA sequencing, microarray data generation, high-throughput, gene-function studies, medical imaging, and electronic medical records, have resulted in the automatic generation of new and vast data repositories. Mining and managing such biomedical data is a complex procedure that requires several processing phases. Especially in the case of biomedical images, proper preprocessing, (e.g., image enhancement, color processing), feature extraction and classification are required.

Conclusions and Future Work

Tools and workflows to support the different phases of the image mining process will be accessible through a simple semantic search in a web repository administered by open source workflow tools. Proper authentication and encryption mechanisms have been utilized in order to guarantee the appropriate security.

Impact

The proposed framework supports the knowledge discovery cycle downstream of image analysis tasks, i.e., from exploratory image preprocessing and transformation to pattern discovery, hypothesis induction and image recognition. In cases where the available resources do not match the requirements of the task at a researcher's mind, the platform can make far easier the development of new solutions by reusing and combining available partial solutions. An ultimate goal of the proposed approach is to reduce time from innovation to deployment. A researcher's work for a specific image processing task will be assessed by the image processing community, and outstanding research results will be picked up and tested on other type of images.

Keywords

distributed mining gateway, biomedical images, Web Services

URL for further information

<http://www.e-lico.eu/>

Detailed analysis

This work in the context of e-LICO (e-Laboratory for Interdisciplinary Collaborative Research in Data Mining and Data-Intensive Sciences) project funded by Information Society Technology program of the European Commission, provides an open framework based on Web Services that provides access to complete tools for distributed data mining of biomedical image data. Web Services are emerging as a promising technology to build distributed applications. It is an implementation of Service Oriented Architecture (SOA) that supports the concept of loosely-coupled, open-standard, language - and platform-independent systems. The latter allow service providers to modify backend functions while maintaining the same interface to clients. Web Services

are accessed through the HTTP/HTTPS protocols and utilize XML (eXtensible Markup Language) for data exchange. This in turn implies that Web Services are independent of platform, programming language, tool and network infrastructure. Services can be assembled and composed in such a way to foster the reuse of existing back-end infrastructure.

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