Workflows for Data Mining in Integrated multi-modal Data of Intracranial Aneurysms using KNIME

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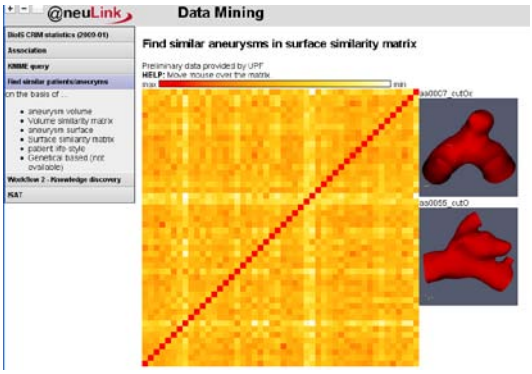

Intracranial aneurysms are bulbous expansions of the intracranial vessels that may rupture and lead to subarachnoid haemorrhage, a bleeding in the space lining the brain. This can result in severe disability or death of the affected person. The prediction of the individual rupture risk of a patient based on information from images, haemodynamic simulations, clinical parameters and genetic markers is one of the aims of the European Integrated Project @neurIST. The project developed an architecture [1] which allows the integration of multi-modal data from clinical information systems. Data mining capabilities have been developed in a Knowledge Discovery application suite called @neuLink [2]. Maintenance, re-use of mining strategies and user presentation of data flows is difficult in monolithic mining scripts. To cope with this problem, @neuLink integrates the Konstanz Information Miner (KNIME) [3] as a workflow engine and provides aggregated data mining results based on R scripts and Weka [4]. The advantage of this solution is a better understanding of the workflow, re-usability of data mining strategies and an increased maintainability.

One example sub-workflow is the application of clustering algorithms to find similar aneurysms. This is based on Zernike moments [5] extracted from images of aneurysms. The resulting similarity matrix is depicted in the screenshot.

Several @neurIST partners developed and implemented rupture risk and treatment outcome models as sub-workflows, which are currently being integrated in consensual models.

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