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Fons J Verbeek is a professor at the Leiden Institute of Advanced Computer Science (LIACS). |
He is cluster head of the section Imaging and BioInformatics at LIACS.

The research of Verbeek has a focus on the development of robust methods for "large-scale" image processing and analysis in the biosciences. In addition, methodology is developed to connect results from the analysis of (microscope) images to biosciences repositories so as to augment the information that is obtained with knowledge. The image processing is applied on 2D and 3D multli-channel microscope images. Through collaborations with research groups in the biomedical domain a number of image analysis pipelines have been developed that have rendered lots of results over the past years; both in terms of computer science methodology and in useful measurements. Pattern recognition procedures are supported with Information Visualization so as to communicate the outcomes in the best possible way.

Verbeek et al develop and design new computational approaches for data analysis. This is with the application domain in mind but nevertheless not (always) directly connected with a particular implementation. The research group has been very active in verifying and validating features in a theoretical setting so that we can make sure that if used in an application, the outcomes informs us with the right data. This research on algorithm development and validation is an important ingredient in the current research. Data analysis goes hand in hand with data visualization and there is ample research being done to make challenging interactive visualizations; esp. in the biomedical domain.

Information needs to be shared and integrated with other information in order to obtain strong evidence from the data. We have conducted projects to set up image databases and connect these with other biosciences resources. In addition, we have been very active in the proper annotation of images with well-described concepts. To that end we have been using and developing ontologies as well as conceptual structures and tools for these ontologies. In particular, visualization of the ontologies so that content can be well understood.

Integration of results is also accomplished by modelling. In the research group a special interest on modelling of biological phenomena with the Petri Net formalism has emerged over the past years. Successful applications of Petri Nets in the field of modelling of disease have published, especially the modelling of Tuberculosis.

One of the animal model systems the group is involved with is the zebrafish. Methodology development in image and data analysis has often been applied in the field of zebrafish high-throughput research. The development of methods is in data analysis, but also in the development of new automated microscopes for 3D imaging of zebrafish and other animal model systems.

The section Imaging & BioInformatics collaborates the Leiden Institute of Biology, the Leiden Centre for Drug Research, the Mathematical Institute and several groups of the LUMC.