Technically Assisted Analysis of Large Quantities of Numerical Data in Preclinical Tumor Research

D. Pollig, C. Disselhorst-Klug
Department Rehabilitation and Prevention Engineering, Institute of Applied Medical Engineering, RWTH Aachen University, Germany

Introduction
The joint research project ForSaTum aims at a faster realisation of novel concepts for preclinical cancer therapy. Cancer research requires extensive animal trials with large cohorts of e.g. mice. Therefore, large quantities of numerical data e.g. from murine histology or from a multispectral fluorescence system are collected and have to be analysed. Currently, such analyses are performed manually and hence time consuming and prone to error. As a consequence, analysis tools are needed which ensure a reliable and fast analysis of the large quantities of numerical data. Reliability and efficiency are achievable by supporting the researcher during the analysis workflow and automation of the calculations.

Methods
Preclinical cancer research requires the interdisciplinary cooperation of experts from different research disciplines. Experts from the disciplines were interviewed to determine their professional profile, the different kinds of data they usually obtain (e.g. data from a hemogram or tumor size), typical objectives of their data analysis (e.g. a t test) and their mathematical workflows to achieve these objectives. The results of the experts’ interviews correlated with their profiles were interpreted to establish, as central component of the analysis assistant system, a rule based system with a knowledge base. The resulting analysis assistant system infers the user’s objective to generate workflows based on the user profile and the data the user wants to analyse. The user chooses one of these workflows which is then automatically executed by a calculation component.

Results
The validation results confirm that the analysis assistant system recommends appropriate workflows and that the whole analysis process has been accelerated and made more reliable than the manual execution.