

# Preface

The VISCERAL project<sup>1</sup> organized Benchmarks for analysis and retrieval of 3D medical images (CT and MRI) at a large scale. VISCERAL used an innovative cloud-based evaluation approach, where the image data were stored centrally on a cloud infrastructure, while participants placed their programs in virtual machines on the cloud. This way of doing evaluation will become increasingly important as evaluation of algorithms on increasingly large and potentially sensitive data that cannot be distributed will be done.

This book presents the points of view of both the organizers of the VISCERAL Benchmarks and the participants in these Benchmarks. The practical experience and knowledge gained in running such benchmarks in the new paradigm is presented by the organizers, while the participants report on their experiences with the evaluation paradigm from their point of view, as well as giving a description of the approaches submitted to the Benchmarks and the results obtained.

This book is divided into five parts. Part I presents the cloud-based benchmarking and Evaluation-as-a-Service paradigm that the VISCERAL Benchmarks used. Part II focusses on the datasets of medical images annotated with ground truth created in VISCERAL that continue to be available for research use, covering also the practical aspects of getting permission to use medical data and manually annotating 3D medical images efficiently and effectively. The VISCERAL Benchmarks are described in Part III, including a presentation and analysis of metrics used in the evaluation of medical image analysis and search. Finally, Parts IV and V present reports of some of the participants in the VISCERAL Benchmarks, with Part IV devoted to the Anatomy Benchmarks, which focused on segmentation and detection, and Part V devoted to the Retrieval Benchmark.

This book has two main audiences: *Medical Imaging Researchers* will be most interested in the actual segmentation, detection and retrieval results obtained for the tasks defined for the VISCERAL Benchmarks, as well as in the resources (annotated medical images and open source code) generated in the VISCERAL project,

---

<sup>1</sup><http://visceral.eu>

while *eScience and Computational Science Reproducibility Advocates* will gain from the experience described in using the Evaluation-as-a-Service paradigm for evaluation and benchmarking on huge amounts of data.

Vienna, Austria  
Sierre, Switzerland  
Vienna, Austria  
September 2016

Allan Hanbury  
Henning Müller  
Georg Langs

Cloud-Based Benchmarking of Medical Image Analysis

Hanbury, A.; Müller, H.; Langs, G. (Eds.)

2017, XVIII, 254 p. 93 illus., 39 illus. in color., Hardcover

ISBN: 978-3-319-49642-9