VISCERAL-VISual Concept Extraction challenge in RAdioLogy: Segmentation challenge: overview, insights and preliminary results

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Purpose: Since during clinical routine, only a small portion of increasing amounts of medical imaging data are accessible, this project aims to provide the necessary data for research, and to conduct competitions for identifying successful computational strategies.

Material and Methods: The ongoing VISCERAL project has developed a cloud–based infrastructure for evaluation of large medical image data sets and has organized competitions to exploit and compare multiple state–of–the–art solutions designed for segmentation and landmark localization. The first competition focused on automatic identification, localization and segmentation of organs in images (anatomy benchmark). Therefore, an anatomical reference annotation data base, the gold corpus, was created using 391 CT and MRI data sets with 20 different organs and 40 landmarks annotated.

Results: At the second anatomy benchmark, 4535 structure segmentations and 122 landmark location lists were submitted. Seven participants submitted results for the segmentation tasks in multiple organs using whole–body CT or contrast–enhanced scans. One participant contributed segmentations on whole–body MRI and on contrast–enhanced MR abdomen volumes. Two participants submitted landmark localization results. Evaluation metric results between the heterogeneous benchmark participants will be presented.

Conclusion: Via VISCERAL, different computational algorithms are brought to large medical imaging data sets to support the implementation of novel tools for clinical diagnostic image assessment and workflow. VISCERAL will result in two data bases as an open-access resource, i.e. the gold corpus with expert manual annotations and the silver corpus with data computed by benchmark participants algorithms. Further benchmarks will focus on retrieval of similar cases and lesion detection.

Exactly 250 words