CT volumes with multiple organ segmentations (CT-ORG)

Summary

This dataset consists of 140 computed tomography (CT) scans, each with five organs labeled in 3D: lung, bones, liver, kidneys and bladder. The brain is also labeled on the minority of scans which show it.

Patients were included based on the presence of lesions in one or more of the labeled organs. Most of the images exhibit liver lesions, both benign and malignant. Some also exhibit metastatic disease in other organs such as bones and lungs.

The images come from a wide variety of sources, including abdominal and full-body; contrast and non-contrast; low-dose and high-dose CT scans. 131 images are dedicated CTs, the remaining 9 are the CT component taken from PET-CT exams. This makes the dataset ideal for training and evaluating organ segmentation algorithms, which ought to perform well in a wide variety of imaging conditions.

The dataset includes large and easily-located organs such as the lungs, as well as small and difficult ones like the bladder. We hope the dataset will enable widespread adoption of multi-class organ segmentation, as well as competitive benchmarking of algorithms for it.

The data are divided into a testing set of 21 CT scans, and a training set of the remaining 140. For the training set, the lungs and bones were automatically segmented by morphological image processing. For the testing set, the lungs and bones were segmented manually. All other organs were segmented manually in both the training and testing sets. Manual segmentations were done with ITK-SNAP (https://www.itksnap.org), starting with semi-automatic active contour segmentation followed by manual clean-up. The source code for the morphological algorithms is available at:
- https://github.com/bbrister/ctOrganSegmentation.git

Many images were borrowed from the Liver Tumor Segmentation (LiTS) challenge, which the organizers have generously allowed us to distribute. For more information, see the following website and paper:
- https://lits-challenge.com (redirects to https://competitions.codalab.org/competitions/17094)
- Arxiv [1901.04056] The Liver Tumor Segmentation Benchmark (LiTS) (https://arxiv.org/abs/1901.04056)

Data Access

Data Access

Data Type	Download all or Query/Filter	License
Images (*.nii.gz, 16.9GB)	*Download* (Download and apply the IBM-Aspera-Connect plugin to your browser to retrieve this faspex package)	CC BY 3.0

Data description (txt, 7 kB)	*Download*	CC BY 3.0

Additional Resources for this Dataset

The following external resources have been made available by the data submitters. These are not hosted or supported by TCIA, but may be useful to researchers utilizing this collection.

- Source code: https://github.com/bbrister/ctOrganSegmentation.git (segmentation code)

Detailed Description
Detailed Description

	Radiology Image Statistics
Modalities	CT , Segmentations
Number of Participants	140
Number of Studies	140
Number of Series	280
Number of Images	280
Images Size (GB)	16.9 GB

- CTs and segmentations are saved in Nifti-1 (.nii.gz) format. Each Nifti-1 file stores the entire CT volume in Hounsfield units. Segmentations are in patient-native space (no change in registration).
- Note: several volumes appear to be left-right flipped relative to others. Please contact the authors or help@cancerimagingarchive.net if this causes confusion.
- The source code for the morphological algorithm (bone and lung segmentation) is available here: https://github.com/bbrister/ctOrganSegmentation.git
- Please explore README.txt that is also bundled in the package.

Citations & Data Usage Policy
Citations & Data Usage Policy

Users must abide by the TCIA Data Usage Policy and Restrictions. Attribution should include references to the following citations:

> ⓘ **Data Citation**
>
> Blaine Rister, Kaushik Shivakumar, Tomomi Nobashi and Daniel L. Rubin. (2019) **CT-ORG: CT volumes with multiple organ segmentations [Dataset]** . DOI: 10.7937/tcia.2019.tt7f4v7o

> ⓘ **Publication Citation**
>
> Rister, B., Yi, D., Shivakumar, K., Nobashi, T., & Rubin, D.L. **CT organ segmentation using GPU data augmentation, unsupervised labels and IOU loss**. https://arxiv.org/abs/1811.11226

> ⓘ **Publication Citation**
>
> Bilic, P., Christ, P., Li, H. B., Vorontsov, E., Ben-Cohen, A., Kaissis, G., … Menze, B. (2023). **The Liver Tumor Segmentation Benchmark (LiTS)** https://arxiv.org/abs/1901.04056 , https://doi.org/10.1016/j.media.2022.102680

> ⓘ **TCIA Citation**
>
> Clark K, Vendt B, Smith K, Freymann J, Kirby J, Koppel P, Moore S, Phillips S, Maffitt D, Pringle M, Tarbox L, Prior F. **The Cancer Imaging Archive (TCIA): Maintaining and Operating a Public Information Repository**, Journal of Digital Imaging, Volume 26, Number 6, December, 2013, pp 1045-1057. DOI: 10.1007/s10278-013-9622-7

Other Publications Using This Data

TCIA maintains a list of publications which leverage TCIA data. If you have a manuscript you'd like to add please contact TCIA's Helpdesk.

Versions

Version 1 (Current): Updated 2020/01/09

Data Type	Download all or Query/Filter
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Segmentation code (external link)	*Search*
Data description	*Download*

Added new subjects.