Data from the training set of the 2019 Kidney and Kidney Tumor Segmentation Challenge (C4KC-KiTS)

Summary

This collection contains CT scans and segmentations from subjects from the training set of the 2019 Kidney and Kidney Tumor Segmentation Challenge (KiTS19). The challenge aimed to accelerate progress in automatic 3D semantic segmentation by releasing a dataset of CT scans for 210 patients with manual semantic segmentations of the kidneys and tumors in the corticomedullary phase.

The imaging was collected during routine care of patients who were treated by either partial or radical nephrectomy at the University of Minnesota Medical Center. Many of the CT scans were acquired at referring institutions and are therefore heterogeneous in terms of scanner manufacturers and acquisition protocols. Semantic segmentations were performed by students under the supervision of an experienced urologic cancer surgeon.

Protocol

Please refer to the data descriptor manuscript for a comprehensive account of the data collection and annotation process - arXiv:1904.00445. The Clinical Trial Time Point is calculated from Day of Surgery.

Acknowledgements

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- Climb 4 Kidney Cancer - Many of the students who worked on the chart review and manual segmentations for this dataset were graciously supported by Climb 4 Kidney Cancer (C4KC) as "C4KC Scholars"
- Intuitive Surgical - A prize of $5,000 was awarded by Intuitive Surgical to the KiTS19 Challenge's highest scoring team
- The National Cancer Institute of The National Institutes of Health - This work was supported under Award Number R01CA225435. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health
- Harmonization of the components of this dataset, including into standard DICOM representation, was supported in part by the NCI Imaging Data Commons consortium. NCI Imaging Data Commons consortium is supported by the contract number 19X037Q from Leidos Biomedical Research under Task Order HHSN26100071 from NCI

Data Access

Data Type	Download all or Query/Filter	License
Images and Segmentations (DICOM, 40.7GB)	_Download Search_ (Download requires the NBIA Data Retriever)	CC BY 3.0
Clinical Data (CSV, 82 kB)	_Download_	CC BY 3.0

Additional Resources for this Dataset

The NCI Cancer Research Data Commons (CRDC) provides access to additional data and a cloud-based data science infrastructure that connects data sets with analytics tools to allow users to share, integrate, analyze, and visualize cancer research data.

- Imaging Data Commons (IDC) (Imaging Data)

Detailed Description

Collection Statistics	Radiology Image Statistics
Modalities	CT, SEG
Number of Participants	210
Number of Studies	210
Number of Series	621
Number of Images	71,423
Image Size (GB)	40.7

Note:

The segmentation corresponds to the arterial phase in every case. No processing or analysis was done on the other phases.

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**
>
> Heller, N., Sathianathen, N., Kalapara, A., Walczak, E., Moore, K., Kaluzniak, H., Rosenberg, J., Blake, P., Rengel, Z., Oestreich, M., Dean, J., Tradewell, M., Shah, A., Tejpaul, R., Edgerton, Z., Peterson, M., Raza, S., Regmi, S., Papanikolopoulos, N., Weight, C. (2019) **Data from C4KC-KiTS** [Data set]. The Cancer Imaging Archive. DOI: 10.7937/TCIA.2019.IX49E8NX

ⓘ **Publication Citation**

Heller, N., Isensee, F., Maier-Hein, K. H., Hou, X., Xie, C., Li, F., Nan, Y., Mu, G., Lin, Z., Han, M., Yao, G., Gao, Y., Zhang, Y., Wang, Y., Hou, F., Yang, J., Xiong, G., Tian, J., Zhong, C., Ma, J., Rickman, J., Dean, J., Stai, B., Tejpaul, R., Oestreich, M., Blake, P., Kaluzniak, H., Raza, S., Rosenberg, J., Moore, K., Walczak, E., Rengel, Z., Edgerton, Z., Vasdev, R., Peterson, M., McSweeney, S., Peterson, S., Kalapara, A., Sathianathen, N., Papanikolopoulos, N., Weight, C. (2021) **The state of the art in kidney and kidney tumor segmentation in contrast-enhanced CT imaging: Results of the KiTS19 challenge**. Medical Image Analysis, 67, 101821. https://doi.org/10.1016/j.media.2020.101821

ⓘ **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. (2013) **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 our data. If you have a publication you'd like to add please contact TCIA's Helpdesk.

Versions

Version 3 (Current): Updated 2020/06/18

Data Type	Download all or Query/Filter
Images and Segmentations (DICOM, 40.7GB)	*Download Search* (Requires NBIA Data Retriever)
Clinical Data (CSV, 82 kB)	*Download*

Upon initial publication of this dataset the segmentations were stored as sagittal series, while the CT images are axial. This caused difficulties loading this dataset into various DICOM tools. Those segmentations have now been converted (in a lossless fashion) to axial to resolve these issues.

Version 2: Updated 2020/03/23

Data Type	Download all or Query/Filter
Images and Segmentations (DICOM, 40.7GB)	Unavailable, see version 3 note.
Clinical Data (CSV, 82 kB)	*Download*

Added clinical data spreadsheet.

Version 1: Updated 2019/12/18

Data Type	Download all or Query/Filter
Images (DICOM, 40.7GB)	Unavailable, see version 3 note.