

DuPLUS: Dual-Prompt Vision-Language Framework for Universal Medical Image Segmentation and Prognosis

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1. Dataset details

This section provides a comprehensive overview of the segmentation datasets utilized in our study, with details on subject numbers, imaging modalities, annotation schemes, and data sources.

BCV: The BCV dataset [7] comprises abdominal CT scans from 50 subjects, with 30 cases publicly released for training purposes. A total of thirteen abdominal organs were delineated in 3D using MIPAV software, covering the spleen, both kidneys, gallbladder, esophagus, liver, stomach, aorta, inferior vena cava, portal and splenic veins, pancreas, and both adrenal glands. In instances where an organ was absent (e.g., gallbladder or right kidney), it was excluded from labeling. The scans were originally acquired during routine clinical practice at Vanderbilt University Medical Center.

LiTS: The LiTS dataset [1] contains 201 abdominal CT volumes, of which 131 are provided for training and 70 for testing; annotations are available exclusively for the training set. Each case includes coarse liver segmentations along with fine-grained tumor masks. Data were collected across several international institutions, including Ludwig Maximilian University of Munich, Radboud University Medical Center Nijmegen, Polytechnique and CHUM Research Center Montréal, Tel Aviv University, Sheba Medical Center, IRCAD Institute Strasbourg, and the Hebrew University of Jerusalem. The cohort comprises patients diagnosed with liver tumors such as hepatocellular carcinoma (HCC) as well as secondary liver malignancies and metastatic disease originating from colorectal, breast, or lung primaries. The tumors display heterogeneous enhancement characteristics, encompassing both hyperdense and hypodense appearances. The collection integrates pre- and post-treatment abdominal CT scans acquired using diverse scanners and imaging protocols.

KiTS19: The KiTS19 dataset [4] consists of segmented CT scans and corresponding treatment information from 300 patients who underwent either partial or radical

nephrectomy for renal tumors at the University of Minnesota Medical Center between 2010 and 2018. Of these, 210 cases were made publicly accessible, while the remaining 90 were retained for evaluation.

AMOS CT: The AMOS CT [5] subset contains 500 abdominal CT scans collected from patients with tumors or other abnormalities at Longgang District People’s Hospital, using eight different scanners and vendors. Each case includes annotations for 15 organs: spleen, right and left kidneys, gallbladder, esophagus, liver, stomach, aorta, inferior vena cava, pancreas, right and left adrenal glands, duodenum, bladder, and prostate/uterus.

AMOS MR : The AMOS MR [5] subset comprises 100 abdominal MRI scans acquired from the same clinical source and scanner diversity as the AMOS CT subset. Manual annotations are provided for 15 organs, but some cases in the validation set lack bladder and prostate labels, restricting MRI segmentation to 13 organ categories.

StructSeg (SS T): The SS T subset of the StructSeg dataset [8] originated from the StructSeg challenge on organ-at-risk (OAR) and gross target volume (GTV) segmentation for radiation therapy planning in lung and nasopharynx cancers. Specifically, SS T focuses on thoracic OAR segmentation using CT scans from 50 lung cancer patients. Each scan is manually annotated for six critical OARs: left lung, right lung, spinal cord, esophagus, heart, and trachea.

CHAOS: The CHAOS dataset [6] originated from a challenge aimed at abdominal organ segmentation. For this study, we utilize Task 5, which includes MRI scans of 20 subjects acquired in three sequences: T1-in-phase, T1-out-phase, and T2-SPIR. Annotations are provided for four abdominal organs including liver, spleen, and both kidneys.

M&Ms: The M&Ms dataset [2] was developed for the MICCAI 2020 challenge on cardiac magnetic resonance (CMR) segmentation. The dataset includes both healthy individuals and patients diagnosed with hypertrophic and dilated cardiomyopathy. Data acquisition took place across clinical sites in Spain, Germany, and Canada, using scan-

ners from four vendors: Siemens, GE, Philips, and Canon. The training portion consists of 150 annotated studies, while the remaining 170 cases are reserved for testing. Manual annotations include three cardiac structures, left ventricle, right ventricle, and left ventricular myocardium at both end-diastolic and end-systolic phases.

DLBS: The Dallas Lifespan Brain Study (DLBS) [9] is a longitudinal neuroimaging project designed to investigate the preservation and decline of cognitive function across the adult lifespan. A central focus of the study is on resilience mechanisms and the early trajectories that may lead toward Alzheimer’s disease. For our work, we utilize 213 T1-weighted MRI scans from the DLBS cohort, which include manual segmentations of cerebrospinal fluid, gray matter, and white matter.

AutoPET: The AutoPET dataset [3] provides 1,014 annotated whole-body Fluorodeoxyglucose (FDG) PET/CT studies. Among these, 501 scans are from patients diagnosed with malignant lymphoma, melanoma, or non-small cell lung cancer (NSCLC), while the remaining 513 serve as negative control studies without PET-positive malignant lesions.

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