Assignment 1 - Problem 1: 3D Segmentation

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In [1]:

```python
import glob
import logging
import os
from pathlib import Path
import shutil
import sys
import tempfile

import nibabel as nib
import numpy as np
from ignite.engine import create_supervised_trainer, Events
from monai.config import print_config
from monai.data import ArrayDataset, create_test_image_3d, decollate_batch, DataLoader
from monai.handlers import (
    EarlyStopHandler,
    MeanDice,
    MeanIoUHandler,
    SurfaceDistance,
    HausdorffDistance,
    StatsHandler,
    TensorBoardImageHandler,
    TensorBoardStatsHandler,
)
from monai.losses import DiceLoss
from monai.metrics import meandice
from monai.networks.nets import UNet
from monai.transforms import (
    Activations,
    EnsureChannelFirst,
    CenterSpatialCrop,
    ToTensor,
    NormalizeIntensity,
    AsDiscrete,
    Compose,
    LoadImage,
    RandSpatialCrop,
    Resize,
    SaveImage,
    ScaleIntensity,
)
from monai.utils import first

import h5py
import ignite
import matplotlib.image as mpimg
import matplotlib.pyplot as plt
import numpy as np
import pandas as pd
import torch

print_config()
```

MONAI version: 1.0.0

```
Numpy version: 1.23.1
Pytorch version: 1.12.1
MONAI flags: HAS_EXT = False, USE_COMPILED = False, USE_META_DICT = False
MONAI rev id: 170093375ce29267e45681fcec09dfa856e1d7e7
MONAI __file__: /home/holy/anaconda3/envs/health/lib/python3.10/site-packages/monai/__in
it__.py

Optional dependencies:
Pytorch Ignite version: NOT INSTALLED or UNKNOWN VERSION.
Nibabel version: 4.0.2
scikit-image version: NOT INSTALLED or UNKNOWN VERSION.
Pillow version: 9.2.0
Tensorboard version: 2.10.1
gdown version: NOT INSTALLED or UNKNOWN VERSION.
TorchVision version: 0.13.1
tqdm version: 4.64.1
lmdb version: NOT INSTALLED or UNKNOWN VERSION.
psutil version: 5.9.0
pandas version: 1.4.4
einops version: NOT INSTALLED or UNKNOWN VERSION.
transformers version: 4.23.1
mlflow version: NOT INSTALLED or UNKNOWN VERSION.
pynrrd version: NOT INSTALLED or UNKNOWN VERSION.

For details about installing the optional dependencies, please visit:
    https://docs.monai.io/en/latest/installation.html#installing-the-recommended-depende
ncies
```

In [2]:
```python
logging.basicConfig(stream=sys.stdout, level=logging.INFO)
```

Problem 1: 3D Segmentation

Data Loading

Function declarations

In [3]:
```python
def problem1_load_dataset(
    dir_path,
    img_column_name="image",
    label_column_name="label"):

    def _load_all_data_from_dir(dir_path, img_column_name="image", label_column_name="la
        def _load_h5_data(file_path, img_column_name="image", label_column_name="label")
            data = h5py.File(file_path, "r")
            image = data[img_column_name][:]
            seg = data[label_column_name][:]
            return image, seg

        df_dict = {"image": [], "seg": []}
        for file_name in os.listdir(dir_path):
            file_path = os.path.join(dir_path, file_name)
            if os.path.isfile(file_path) and file_path.endswith(".h5"):
                image, seg = _load_h5_data(file_path)
                df_dict["image"].append(image)
                df_dict["seg"].append(seg)
        df = pd.DataFrame.from_dict(df_dict)
        return df

    df = _load_all_data_from_dir(dir_path, img_column_name, label_column_name)
    return df
```

Function utilization

Load 3D segmentation data from `problem1_datas`.

```
In [4]: df = {}
        df["train"] = problem1_load_dataset("./data/problem1_datas/train")
        df["test"] = problem1_load_dataset("./data/problem1_datas/test")
```

Preprocessing

Define transforms for the input image and the ground truth segmentation.

```
In [5]: imtrans = Compose(
            [
                ScaleIntensity(),
                EnsureChannelFirst(),
                CenterSpatialCrop([96, 96, 64]),
                ToTensor(),
                NormalizeIntensity(),
            ]
        )
        segtrans = Compose(
            [
                EnsureChannelFirst(),
                CenterSpatialCrop([96, 96, 64]),
                ToTensor(),
                NormalizeIntensity(),
            ]
        )

        val_imtrans = Compose(
            [
                EnsureChannelFirst(),
                CenterSpatialCrop([96, 96, 64]),
                ToTensor(),
                NormalizeIntensity(),
            ]
        )

        val_segtrans = Compose(
            [
                EnsureChannelFirst(),
                CenterSpatialCrop([96, 96, 64]),
                ToTensor(),
                NormalizeIntensity(),
            ]
        )
```

Apply the transformations to the train and the valid set. The valid set is taken from `problem1_datas/test`.

```
In [6]: train_ds = ArrayDataset(df["train"]["image"], imtrans, df["train"]["seg"], segtrans)
        val_ds = ArrayDataset(df["test"]["image"], val_imtrans, df["test"]["seg"], val_segtrans)
```

Initialize the dataloaders.

```
In [7]: train_loader = DataLoader(train_ds, batch_size=2, num_workers=2, pin_memory=torch.cuda.i
        val_loader = DataLoader(val_ds, batch_size=2, num_workers=2, pin_memory=torch.cuda.is_av
```

Training and Evaluation

Function declarations

Initializer for the model and the optimizer.

```python
In [8]:  def get_model_and_optimizer(checkpoint_path=None, lr=1e-3, device="cuda:0"):
             device = torch.device(device)
             net = UNet(
                 spatial_dims=3,
                 in_channels=1,
                 out_channels=1,
                 channels=(16, 32, 64, 128, 256),
                 strides=(2, 2, 2, 2),
                 num_res_units=2,
             ).to(device)
             opt = torch.optim.Adam(net.parameters(), lr)
             if checkpoint_path is not None:
                 checkpoint = torch.load(checkpoint_path)
                 net.load_state_dict(checkpoint["net"])
                 opt.load_state_dict(checkpoint["opt"])
             return net, opt
```

Training loop.

```python
In [9]:  def training(net, opt, loss_fn, metrics, eval_loader, eval_epoch=1, device="cuda:0", log
             device = torch.device(device)

             def init_evaluator(metrics):
                 post_pred = Compose(
                     [Activations(sigmoid=True), AsDiscrete(threshold=0.5)]
                 )
                 post_label = Compose([AsDiscrete(threshold=0.5)])

                 evaluator = ignite.engine.create_supervised_evaluator(
                     net,
                     val_metrics,
                     device,
                     True,
                     output_transform=lambda x, y, y_pred: (
                         [post_pred(i) for i in decollate_batch(y_pred)],
                         [post_label(i) for i in decollate_batch(y)]
                     ),
                 )
                 return evaluator

             # Create trainer
             trainer = create_supervised_trainer(
                 net, opt, loss_fn, device, False
             )

             log_dir = os.path.join("./save/problem1/", log_name)

             # Add handlers
             checkpoint_handler = ignite.handlers.ModelCheckpoint(
                 log_dir, "net", n_saved=1, require_empty=False
             )
             trainer.add_event_handler(
                 event_name=ignite.engine.Events.EPOCH_COMPLETED,
                 handler=checkpoint_handler,
                 to_save={"net": net, "opt": opt},
             )

             train_stats_handler = StatsHandler(name="trainer", output_transform=lambda x: x)
```

```
        train_stats_handler.attach(trainer)

        train_tensorboard_stats_handler = TensorBoardStatsHandler(log_dir=log_dir, output_tr
        train_tensorboard_stats_handler.attach(trainer)

        evaluator = init_evaluator(metrics)
        @trainer.on(
            ignite.engine.Events.EPOCH_COMPLETED(every=eval_epoch)
        )
        def run_validation(engine):
            evaluator.run(val_loader)

        val_stats_handler = StatsHandler(
            name="evaluator",
            output_transform=lambda x: None,
            global_epoch_transform=lambda x: trainer.state.epoch,
        )
        val_stats_handler.attach(evaluator)

        val_tensorboard_stats_handler = TensorBoardStatsHandler(
            log_dir=log_dir,
            output_transform=lambda x: x,
            global_epoch_transform=lambda x: trainer.state.epoch,
        )
        val_tensorboard_stats_handler.attach(evaluator)

        val_tensorboard_image_handler = TensorBoardImageHandler(
            log_dir=log_dir,
            batch_transform=lambda batch: (batch[0], batch[1]),
            output_transform=lambda output: output[0],
            global_iter_transform=lambda x: trainer.state.epoch,
        )
        evaluator.add_event_handler(
            event_name=ignite.engine.Events.EPOCH_COMPLETED,
            handler=val_tensorboard_image_handler,
        )
        return trainer, evaluator
```

Prediction and the result display.

In [10]:
```python
def predict(net, img, seg, sample_id):
    res = net(img.cuda().unsqueeze(dim=0))
    y = (torch.sigmoid(res) >= 0.5).squeeze()

    f, axarr = plt.subplots(3)
    plt.suptitle(
        f"Input image #{sample_id} (top), predicted segmentation (middle), and ground tr
        fontsize=8)
    axarr[0].imshow(img.squeeze().numpy()[0, ...])
    axarr[1].imshow(y.cpu().numpy()[0, ...])
    axarr[2].imshow(seg.squeeze().numpy()[0, ...])
```

Other training and evaluation settings.

In [11]:
```python
loss_fn = DiceLoss(sigmoid=True)
```

In [12]:
```python
val_metrics = {
    "dice": MeanDice(),
    "jaccard": MeanIoUHandler(),
    "asd": SurfaceDistance(),
    "hausdorff95": HausdorffDistance(percentile=95)}
```

Experiment 1: Normal/Default (`1e-3`)

In [13]:
```python
net, opt = get_model_and_optimizer(checkpoint_path=None, lr=1e-3)
```

In [14]:
```python
trainer, evaluator = training(net, opt, loss_fn, val_metrics, val_loader, log_name="exp1
```

Start training.

In [15]:
```python
max_epochs = 20
state = trainer.run(train_loader, max_epochs)
```

```
2022-10-17 19:41:32,363 - Engine run starting with max_epochs=20.
2022-10-17 19:41:39,985 - Epoch: 1/20, Iter: 1/7 -- Loss: 1.0436
2022-10-17 19:41:40,066 - Epoch: 1/20, Iter: 2/7 -- Loss: 0.9233
2022-10-17 19:41:40,126 - Epoch: 1/20, Iter: 3/7 -- Loss: 0.8733
2022-10-17 19:41:40,185 - Epoch: 1/20, Iter: 4/7 -- Loss: 0.7853
2022-10-17 19:41:40,248 - Epoch: 1/20, Iter: 5/7 -- Loss: 0.7826
2022-10-17 19:41:40,632 - Epoch: 1/20, Iter: 6/7 -- Loss: 0.7091
2022-10-17 19:41:40,697 - Epoch: 1/20, Iter: 7/7 -- Loss: 0.7487
2022-10-17 19:41:40,899 - Engine run starting with max_epochs=1.
```
<div style="background-color:#fdd">

/home/holy/anaconda3/envs/health/lib/python3.10/site-packages/monai/handlers/tensorboard
_handlers.py:260: UserWarning: ignoring non-scalar output in TensorBoardStatsHandler, ma
ke sure `output_transform(engine.state.output)` returns a scalar or a dictionary of key
and scalar pairs to avoid this warning. <class 'tuple'>
  warnings.warn(
</div>

```
2022-10-17 19:41:52,701 - Epoch[1] Metrics -- asd: 10.1956 dice: 0.6240 hausdorff95: 26.
8144 jaccard: 0.4610
2022-10-17 19:41:53,066 - Epoch[1] Complete. Time taken: 00:00:11.901
2022-10-17 19:41:53,068 - Engine run complete. Time taken: 00:00:12.167
2022-10-17 19:41:53,248 - Epoch[1] Complete. Time taken: 00:00:20.690
2022-10-17 19:41:54,393 - Epoch: 2/20, Iter: 1/7 -- Loss: 0.7754
2022-10-17 19:41:54,513 - Epoch: 2/20, Iter: 2/7 -- Loss: 0.5705
2022-10-17 19:41:54,878 - Epoch: 2/20, Iter: 3/7 -- Loss: 0.5994
2022-10-17 19:41:54,967 - Epoch: 2/20, Iter: 4/7 -- Loss: 0.6081
2022-10-17 19:41:55,365 - Epoch: 2/20, Iter: 5/7 -- Loss: 0.6088
2022-10-17 19:41:55,443 - Epoch: 2/20, Iter: 6/7 -- Loss: 0.5907
2022-10-17 19:41:55,846 - Epoch: 2/20, Iter: 7/7 -- Loss: 0.6022
2022-10-17 19:41:56,064 - Engine run starting with max_epochs=1.
2022-10-17 19:42:07,700 - Epoch[2] Metrics -- asd: 10.0862 dice: 0.6865 hausdorff95: 25.
8147 jaccard: 0.5336
2022-10-17 19:42:08,121 - Epoch[1] Complete. Time taken: 00:00:11.832
2022-10-17 19:42:08,122 - Engine run complete. Time taken: 00:00:12.057
2022-10-17 19:42:08,256 - Epoch[2] Complete. Time taken: 00:00:15.004
2022-10-17 19:42:09,285 - Epoch: 3/20, Iter: 1/7 -- Loss: 0.5775
2022-10-17 19:42:09,347 - Epoch: 3/20, Iter: 2/7 -- Loss: 0.4517
2022-10-17 19:42:09,714 - Epoch: 3/20, Iter: 3/7 -- Loss: 0.4888
2022-10-17 19:42:09,823 - Epoch: 3/20, Iter: 4/7 -- Loss: 0.4859
2022-10-17 19:42:10,212 - Epoch: 3/20, Iter: 5/7 -- Loss: 0.4465
2022-10-17 19:42:10,341 - Epoch: 3/20, Iter: 6/7 -- Loss: 0.4961
2022-10-17 19:42:10,704 - Epoch: 3/20, Iter: 7/7 -- Loss: 0.4614
2022-10-17 19:42:10,919 - Engine run starting with max_epochs=1.
2022-10-17 19:42:23,399 - Epoch[3] Metrics -- asd: 8.8694 dice: 0.7407 hausdorff95: 23.3
914 jaccard: 0.5973
2022-10-17 19:42:23,733 - Epoch[1] Complete. Time taken: 00:00:12.569
2022-10-17 19:42:23,735 - Engine run complete. Time taken: 00:00:12.814
2022-10-17 19:42:23,960 - Epoch[3] Complete. Time taken: 00:00:15.700
2022-10-17 19:42:25,042 - Epoch: 4/20, Iter: 1/7 -- Loss: 0.4688
2022-10-17 19:42:25,243 - Epoch: 4/20, Iter: 2/7 -- Loss: 0.3789
2022-10-17 19:42:25,540 - Epoch: 4/20, Iter: 3/7 -- Loss: lr.3791
2022-10-17 19:42:25,785 - Epoch: 4/20, Iter: 4/7 -- Loss: 0.3937
2022-10-17 19:42:26,158 - Epoch: 4/20, Iter: 5/7 -- Loss: 0.3610
2022-10-17 19:42:26,288 - Epoch: 4/20, Iter: 6/7 -- Loss: 0.3906
2022-10-17 19:42:26,611 - Epoch: 4/20, Iter: 7/7 -- Loss: 0.3898
```

```
2022-10-17 19:42:26,968 - Engine run starting with max_epochs=1.
2022-10-17 19:42:38,697 - Epoch[4] Metrics -- asd: 7.0879 dice: 0.7759 hausdorff95: 20.7
664 jaccard: 0.6436
2022-10-17 19:42:39,044 - Epoch[1] Complete. Time taken: 00:00:11.824
2022-10-17 19:42:39,046 - Engine run complete. Time taken: 00:00:12.077
2022-10-17 19:42:39,216 - Epoch[4] Complete. Time taken: 00:00:15.252
2022-10-17 19:42:40,437 - Epoch: 5/20, Iter: 1/7 -- Loss: 0.3958
2022-10-17 19:42:40,519 - Epoch: 5/20, Iter: 2/7 -- Loss: 0.2749
2022-10-17 19:42:40,837 - Epoch: 5/20, Iter: 3/7 -- Loss: 0.3025
2022-10-17 19:42:40,939 - Epoch: 5/20, Iter: 4/7 -- Loss: 0.3248
2022-10-17 19:42:41,314 - Epoch: 5/20, Iter: 5/7 -- Loss: 0.2572
2022-10-17 19:42:41,392 - Epoch: 5/20, Iter: 6/7 -- Loss: 0.3224
2022-10-17 19:42:41,805 - Epoch: 5/20, Iter: 7/7 -- Loss: 0.3053
2022-10-17 19:42:42,057 - Engine run starting with max_epochs=1.
2022-10-17 19:42:53,282 - Epoch[5] Metrics -- asd: 5.4203 dice: 0.7953 hausdorff95: 16.3
648 jaccard: 0.6691
2022-10-17 19:42:53,639 - Epoch[1] Complete. Time taken: 00:00:11.338
2022-10-17 19:42:53,640 - Engine run complete. Time taken: 00:00:11.582
2022-10-17 19:42:53,808 - Epoch[5] Complete. Time taken: 00:00:14.588
2022-10-17 19:42:55,063 - Epoch: 6/20, Iter: 1/7 -- Loss: 0.3482
2022-10-17 19:42:55,170 - Epoch: 6/20, Iter: 2/7 -- Loss: 0.1941
2022-10-17 19:42:55,516 - Epoch: 6/20, Iter: 3/7 -- Loss: 0.2208
2022-10-17 19:42:55,632 - Epoch: 6/20, Iter: 4/7 -- Loss: 0.2537
2022-10-17 19:42:55,982 - Epoch: 6/20, Iter: 5/7 -- Loss: 0.1935
2022-10-17 19:42:56,167 - Epoch: 6/20, Iter: 6/7 -- Loss: 0.2419
2022-10-17 19:42:56,624 - Epoch: 6/20, Iter: 7/7 -- Loss: 0.2402
2022-10-17 19:42:56,829 - Engine run starting with max_epochs=1.
2022-10-17 19:43:06,868 - Epoch[6] Metrics -- asd: 4.5546 dice: 0.8117 hausdorff95: 14.3
205 jaccard: 0.6908
2022-10-17 19:43:07,199 - Epoch[1] Complete. Time taken: 00:00:10.114
2022-10-17 19:43:07,200 - Engine run complete. Time taken: 00:00:10.369
2022-10-17 19:43:07,318 - Epoch[6] Complete. Time taken: 00:00:13.509
2022-10-17 19:43:08,229 - Epoch: 7/20, Iter: 1/7 -- Loss: 0.2861
2022-10-17 19:43:08,325 - Epoch: 7/20, Iter: 2/7 -- Loss: 0.1194
2022-10-17 19:43:08,717 - Epoch: 7/20, Iter: 3/7 -- Loss: 0.1735
2022-10-17 19:43:08,790 - Epoch: 7/20, Iter: 4/7 -- Loss: 0.1780
2022-10-17 19:43:09,173 - Epoch: 7/20, Iter: 5/7 -- Loss: 0.1384
2022-10-17 19:43:09,229 - Epoch: 7/20, Iter: 6/7 -- Loss: 0.1741
2022-10-17 19:43:09,466 - Epoch: 7/20, Iter: 7/7 -- Loss: 0.1844
2022-10-17 19:43:09,651 - Engine run starting with max_epochs=1.
2022-10-17 19:43:17,768 - Epoch[7] Metrics -- asd: 3.8371 dice: 0.8340 hausdorff95: 13.0
533 jaccard: 0.7209
2022-10-17 19:43:17,990 - Epoch[1] Complete. Time taken: 00:00:08.130
2022-10-17 19:43:17,991 - Engine run complete. Time taken: 00:00:08.338
2022-10-17 19:43:18,108 - Epoch[7] Complete. Time taken: 00:00:10.789
2022-10-17 19:43:18,793 - Epoch: 8/20, Iter: 1/7 -- Loss: 0.2367
2022-10-17 19:43:19,029 - Epoch: 8/20, Iter: 2/7 -- Loss: 0.0913
2022-10-17 19:43:19,101 - Epoch: 8/20, Iter: 3/7 -- Loss: 0.1126
2022-10-17 19:43:19,525 - Epoch: 8/20, Iter: 4/7 -- Loss: 0.1430
2022-10-17 19:43:19,583 - Epoch: 8/20, Iter: 5/7 -- Loss: 0.0942
2022-10-17 19:43:19,924 - Epoch: 8/20, Iter: 6/7 -- Loss: 0.1276
2022-10-17 19:43:19,982 - Epoch: 8/20, Iter: 7/7 -- Loss: 0.1430
2022-10-17 19:43:20,113 - Engine run starting with max_epochs=1.
2022-10-17 19:43:27,325 - Epoch[8] Metrics -- asd: 3.9287 dice: 0.8248 hausdorff95: 13.1
391 jaccard: 0.7082
2022-10-17 19:43:27,533 - Epoch[1] Complete. Time taken: 00:00:07.271
2022-10-17 19:43:27,534 - Engine run complete. Time taken: 00:00:07.420
2022-10-17 19:43:27,613 - Epoch[8] Complete. Time taken: 00:00:09.504
2022-10-17 19:43:28,281 - Epoch: 9/20, Iter: 1/7 -- Loss: 0.2160
2022-10-17 19:43:28,333 - Epoch: 9/20, Iter: 2/7 -- Loss: 0.0433
2022-10-17 19:43:28,550 - Epoch: 9/20, Iter: 3/7 -- Loss: 0.0436
2022-10-17 19:43:28,598 - Epoch: 9/20, Iter: 4/7 -- Loss: 0.0879
2022-10-17 19:43:28,804 - Epoch: 9/20, Iter: 5/7 -- Loss: 0.0709
2022-10-17 19:43:28,861 - Epoch: 9/20, Iter: 6/7 -- Loss: 0.0631
2022-10-17 19:43:29,057 - Epoch: 9/20, Iter: 7/7 -- Loss: 0.0800
2022-10-17 19:43:29,177 - Engine run starting with max_epochs=1.
```

```
2022-10-17 19:43:35,468 - Epoch[9] Metrics -- asd: 3.8919 dice: 0.8388 hausdorff95: 14.1
146 jaccard: 0.7288
2022-10-17 19:43:35,638 - Epoch[1] Complete. Time taken: 00:00:06.322
2022-10-17 19:43:35,639 - Engine run complete. Time taken: 00:00:06.461
2022-10-17 19:43:35,724 - Epoch[9] Complete. Time taken: 00:00:08.110
2022-10-17 19:43:36,328 - Epoch: 10/20, Iter: 1/7 -- Loss: 0.1639
2022-10-17 19:43:36,379 - Epoch: 10/20, Iter: 2/7 -- Loss: 0.0029
2022-10-17 19:43:36,607 - Epoch: 10/20, Iter: 3/7 -- Loss: 0.0046
2022-10-17 19:43:36,657 - Epoch: 10/20, Iter: 4/7 -- Loss: 0.0499
2022-10-17 19:43:36,865 - Epoch: 10/20, Iter: 5/7 -- Loss: -0.0087
2022-10-17 19:43:36,924 - Epoch: 10/20, Iter: 6/7 -- Loss: 0.0308
2022-10-17 19:43:37,129 - Epoch: 10/20, Iter: 7/7 -- Loss: 0.0491
2022-10-17 19:43:37,247 - Engine run starting with max_epochs=1.
2022-10-17 19:43:45,024 - Epoch[10] Metrics -- asd: 4.6277 dice: 0.8249 hausdorff95: 16.
4872 jaccard: 0.7075
2022-10-17 19:43:45,332 - Epoch[1] Complete. Time taken: 00:00:07.945
2022-10-17 19:43:45,333 - Engine run complete. Time taken: 00:00:08.084
2022-10-17 19:43:45,446 - Epoch[10] Complete. Time taken: 00:00:09.720
2022-10-17 19:43:46,204 - Epoch: 11/20, Iter: 1/7 -- Loss: 0.1444
2022-10-17 19:43:46,432 - Epoch: 11/20, Iter: 2/7 -- Loss: -0.0720
2022-10-17 19:43:46,675 - Epoch: 11/20, Iter: 3/7 -- Loss: -0.0291
2022-10-17 19:43:46,917 - Epoch: 11/20, Iter: 4/7 -- Loss: 0.0057
2022-10-17 19:43:47,186 - Epoch: 11/20, Iter: 5/7 -- Loss: -0.0236
2022-10-17 19:43:47,417 - Epoch: 11/20, Iter: 6/7 -- Loss: 0.0115
2022-10-17 19:43:47,650 - Epoch: 11/20, Iter: 7/7 -- Loss: 0.0180
2022-10-17 19:43:47,841 - Engine run starting with max_epochs=1.
2022-10-17 19:43:55,423 - Epoch[11] Metrics -- asd: 4.1825 dice: 0.8330 hausdorff95: 15.
1442 jaccard: 0.7219
2022-10-17 19:43:55,761 - Epoch[1] Complete. Time taken: 00:00:07.709
2022-10-17 19:43:55,762 - Engine run complete. Time taken: 00:00:07.920
2022-10-17 19:43:55,893 - Epoch[11] Complete. Time taken: 00:00:10.446
2022-10-17 19:43:56,751 - Epoch: 12/20, Iter: 1/7 -- Loss: 0.1228
2022-10-17 19:43:56,836 - Epoch: 12/20, Iter: 2/7 -- Loss: -0.1276
2022-10-17 19:43:57,209 - Epoch: 12/20, Iter: 3/7 -- Loss: -0.0808
2022-10-17 19:43:57,309 - Epoch: 12/20, Iter: 4/7 -- Loss: 0.0374
2022-10-17 19:43:57,684 - Epoch: 12/20, Iter: 5/7 -- Loss: -0.0958
2022-10-17 19:43:57,788 - Epoch: 12/20, Iter: 6/7 -- Loss: -0.1098
2022-10-17 19:43:58,162 - Epoch: 12/20, Iter: 7/7 -- Loss: -0.0474
2022-10-17 19:43:58,357 - Engine run starting with max_epochs=1.
2022-10-17 19:44:06,662 - Epoch[12] Metrics -- asd: 3.8168 dice: 0.8416 hausdorff95: 13.
9708 jaccard: 0.7335
2022-10-17 19:44:06,900 - Epoch[1] Complete. Time taken: 00:00:08.333
2022-10-17 19:44:06,901 - Engine run complete. Time taken: 00:00:08.543
2022-10-17 19:44:07,059 - Epoch[12] Complete. Time taken: 00:00:11.164
2022-10-17 19:44:07,801 - Epoch: 13/20, Iter: 1/7 -- Loss: 0.0604
2022-10-17 19:44:08,032 - Epoch: 13/20, Iter: 2/7 -- Loss: -0.1728
2022-10-17 19:44:08,151 - Epoch: 13/20, Iter: 3/7 -- Loss: -0.1466
2022-10-17 19:44:08,511 - Epoch: 13/20, Iter: 4/7 -- Loss: -0.0937
2022-10-17 19:44:08,574 - Epoch: 13/20, Iter: 5/7 -- Loss: -0.1356
2022-10-17 19:44:08,993 - Epoch: 13/20, Iter: 6/7 -- Loss: -0.1768
2022-10-17 19:44:09,049 - Epoch: 13/20, Iter: 7/7 -- Loss: -0.1082
2022-10-17 19:44:09,250 - Engine run starting with max_epochs=1.
2022-10-17 19:44:16,509 - Epoch[13] Metrics -- asd: 3.2738 dice: 0.8633 hausdorff95: 12.
5055 jaccard: 0.7649
2022-10-17 19:44:16,679 - Epoch[1] Complete. Time taken: 00:00:07.223
2022-10-17 19:44:16,680 - Engine run complete. Time taken: 00:00:07.429
2022-10-17 19:44:16,766 - Epoch[13] Complete. Time taken: 00:00:09.706
2022-10-17 19:44:17,349 - Epoch: 14/20, Iter: 1/7 -- Loss: -0.0035
2022-10-17 19:44:17,402 - Epoch: 14/20, Iter: 2/7 -- Loss: -0.2422
2022-10-17 19:44:17,622 - Epoch: 14/20, Iter: 3/7 -- Loss: -0.2066
2022-10-17 19:44:17,674 - Epoch: 14/20, Iter: 4/7 -- Loss: -0.1475
2022-10-17 19:44:17,889 - Epoch: 14/20, Iter: 5/7 -- Loss: -0.2089
2022-10-17 19:44:17,956 - Epoch: 14/20, Iter: 6/7 -- Loss: -0.2251
2022-10-17 19:44:18,149 - Epoch: 14/20, Iter: 7/7 -- Loss: -0.1671
2022-10-17 19:44:18,299 - Engine run starting with max_epochs=1.
2022-10-17 19:44:24,120 - Epoch[14] Metrics -- asd: 3.7308 dice: 0.8584 hausdorff95: 14.
```

4321 jaccard: 0.7582
2022-10-17 19:44:24,333 - Epoch[1] Complete. Time taken: 00:00:05.878
2022-10-17 19:44:24,334 - Engine run complete. Time taken: 00:00:06.034
2022-10-17 19:44:24,513 - Epoch[14] Complete. Time taken: 00:00:07.746
2022-10-17 19:44:25,819 - Epoch: 15/20, Iter: 1/7 -- Loss: -0.0550
2022-10-17 19:44:25,903 - Epoch: 15/20, Iter: 2/7 -- Loss: -0.3099
2022-10-17 19:44:26,571 - Epoch: 15/20, Iter: 3/7 -- Loss: -0.2659
2022-10-17 19:44:26,673 - Epoch: 15/20, Iter: 4/7 -- Loss: -0.1861
2022-10-17 19:44:27,265 - Epoch: 15/20, Iter: 5/7 -- Loss: -0.2703
2022-10-17 19:44:27,368 - Epoch: 15/20, Iter: 6/7 -- Loss: -0.2826
2022-10-17 19:44:27,729 - Epoch: 15/20, Iter: 7/7 -- Loss: -0.2249
2022-10-17 19:44:27,974 - Engine run starting with max_epochs=1.
2022-10-17 19:44:37,864 - Epoch[15] Metrics -- asd: 3.1663 dice: 0.8659 hausdorff95: 12.
3799 jaccard: 0.7692
2022-10-17 19:44:38,312 - Epoch[1] Complete. Time taken: 00:00:10.076
2022-10-17 19:44:38,314 - Engine run complete. Time taken: 00:00:10.336
2022-10-17 19:44:38,479 - Epoch[15] Complete. Time taken: 00:00:13.962
2022-10-17 19:44:39,693 - Epoch: 16/20, Iter: 1/7 -- Loss: -0.1008
2022-10-17 19:44:39,794 - Epoch: 16/20, Iter: 2/7 -- Loss: -0.3676
2022-10-17 19:44:40,183 - Epoch: 16/20, Iter: 3/7 -- Loss: -0.3071
2022-10-17 19:44:40,245 - Epoch: 16/20, Iter: 4/7 -- Loss: -0.2362
2022-10-17 19:44:40,691 - Epoch: 16/20, Iter: 5/7 -- Loss: -0.3324
2022-10-17 19:44:40,774 - Epoch: 16/20, Iter: 6/7 -- Loss: -0.3217
2022-10-17 19:44:41,150 - Epoch: 16/20, Iter: 7/7 -- Loss: -0.2751
2022-10-17 19:44:41,344 - Engine run starting with max_epochs=1.
2022-10-17 19:44:50,569 - Epoch[16] Metrics -- asd: 3.0437 dice: 0.8687 hausdorff95: 11.
8837 jaccard: 0.7726
2022-10-17 19:44:50,922 - Epoch[1] Complete. Time taken: 00:00:09.366
2022-10-17 19:44:50,923 - Engine run complete. Time taken: 00:00:09.578
2022-10-17 19:44:51,051 - Epoch[16] Complete. Time taken: 00:00:12.567
2022-10-17 19:44:52,027 - Epoch: 17/20, Iter: 1/7 -- Loss: -0.1533
2022-10-17 19:44:52,095 - Epoch: 17/20, Iter: 2/7 -- Loss: -0.4248
2022-10-17 19:44:52,516 - Epoch: 17/20, Iter: 3/7 -- Loss: -0.3478
2022-10-17 19:44:52,582 - Epoch: 17/20, Iter: 4/7 -- Loss: -0.2618
2022-10-17 19:44:53,020 - Epoch: 17/20, Iter: 5/7 -- Loss: -0.3630
2022-10-17 19:44:53,083 - Epoch: 17/20, Iter: 6/7 -- Loss: -0.3729
2022-10-17 19:44:53,453 - Epoch: 17/20, Iter: 7/7 -- Loss: -0.3296
2022-10-17 19:44:53,658 - Engine run starting with max_epochs=1.
2022-10-17 19:45:03,026 - Epoch[17] Metrics -- asd: 3.0914 dice: 0.8483 hausdorff95: 12.
4936 jaccard: 0.7416
2022-10-17 19:45:03,372 - Epoch[1] Complete. Time taken: 00:00:09.523
2022-10-17 19:45:03,373 - Engine run complete. Time taken: 00:00:09.714
2022-10-17 19:45:03,507 - Epoch[17] Complete. Time taken: 00:00:12.455
2022-10-17 19:45:04,588 - Epoch: 18/20, Iter: 1/7 -- Loss: -0.1891
2022-10-17 19:45:04,682 - Epoch: 18/20, Iter: 2/7 -- Loss: -0.4251
2022-10-17 19:45:05,030 - Epoch: 18/20, Iter: 3/7 -- Loss: -0.4301
2022-10-17 19:45:05,093 - Epoch: 18/20, Iter: 4/7 -- Loss: -0.3539
2022-10-17 19:45:05,411 - Epoch: 18/20, Iter: 5/7 -- Loss: -0.4232
2022-10-17 19:45:05,664 - Epoch: 18/20, Iter: 6/7 -- Loss: -0.4444
2022-10-17 19:45:05,865 - Epoch: 18/20, Iter: 7/7 -- Loss: -0.3593
2022-10-17 19:45:06,070 - Engine run starting with max_epochs=1.
2022-10-17 19:45:16,030 - Epoch[18] Metrics -- asd: 3.6017 dice: 0.8631 hausdorff95: 13.
9448 jaccard: 0.7652
2022-10-17 19:45:16,459 - Epoch[1] Complete. Time taken: 00:00:10.135
2022-10-17 19:45:16,460 - Engine run complete. Time taken: 00:00:10.388
2022-10-17 19:45:16,635 - Epoch[18] Complete. Time taken: 00:00:13.127
2022-10-17 19:45:17,710 - Epoch: 19/20, Iter: 1/7 -- Loss: -0.2487
2022-10-17 19:45:17,857 - Epoch: 19/20, Iter: 2/7 -- Loss: -0.5332
2022-10-17 19:45:18,143 - Epoch: 19/20, Iter: 3/7 -- Loss: -0.4828
2022-10-17 19:45:18,354 - Epoch: 19/20, Iter: 4/7 -- Loss: -0.3619
2022-10-17 19:45:18,600 - Epoch: 19/20, Iter: 5/7 -- Loss: -0.4512
2022-10-17 19:45:18,808 - Epoch: 19/20, Iter: 6/7 -- Loss: -0.5255
2022-10-17 19:45:19,055 - Epoch: 19/20, Iter: 7/7 -- Loss: -0.4555
2022-10-17 19:45:19,258 - Engine run starting with max_epochs=1.
2022-10-17 19:45:29,027 - Epoch[19] Metrics -- asd: 3.4385 dice: 0.8583 hausdorff95: 13.
2529 jaccard: 0.7560

```
2022-10-17 19:45:29,378 - Epoch[1] Complete. Time taken: 00:00:09.873
2022-10-17 19:45:29,379 - Engine run complete. Time taken: 00:00:10.119
2022-10-17 19:45:29,523 - Epoch[19] Complete. Time taken: 00:00:12.883
2022-10-17 19:45:30,828 - Epoch: 20/20, Iter: 1/7 -- Loss: -0.2949
2022-10-17 19:45:30,920 - Epoch: 20/20, Iter: 2/7 -- Loss: -0.5698
2022-10-17 19:45:31,405 - Epoch: 20/20, Iter: 3/7 -- Loss: -0.4985
2022-10-17 19:45:31,473 - Epoch: 20/20, Iter: 4/7 -- Loss: -0.4458
2022-10-17 19:45:31,899 - Epoch: 20/20, Iter: 5/7 -- Loss: -0.5581
2022-10-17 19:45:31,997 - Epoch: 20/20, Iter: 6/7 -- Loss: -0.5559
2022-10-17 19:45:32,416 - Epoch: 20/20, Iter: 7/7 -- Loss: -0.4793
2022-10-17 19:45:32,693 - Engine run starting with max_epochs=1.
2022-10-17 19:45:42,398 - Epoch[20] Metrics -- asd: 3.1545 dice: 0.8592 hausdorff95: 12.
3979 jaccard: 0.7575
2022-10-17 19:45:42,749 - Epoch[1] Complete. Time taken: 00:00:09.784
2022-10-17 19:45:42,750 - Engine run complete. Time taken: 00:00:10.056
2022-10-17 19:45:42,876 - Epoch[20] Complete. Time taken: 00:00:13.351
2022-10-17 19:45:42,880 - Engine run complete. Time taken: 00:04:10.515
```

Output the eval performance.

In [16]:
```python
evaluator.run(val_loader)
```

```
2022-10-17 19:45:43,056 - Engine run starting with max_epochs=1.
2022-10-17 19:45:52,560 - Epoch[20] Metrics -- asd: 3.1545 dice: 0.8592 hausdorff95: 12.
3979 jaccard: 0.7575
2022-10-17 19:45:52,908 - Epoch[1] Complete. Time taken: 00:00:09.471
2022-10-17 19:45:52,912 - Engine run complete. Time taken: 00:00:09.853
```

Out[16]:
```
State:
        iteration: 10
        epoch: 1
        epoch_length: 10
        max_epochs: 1
        output: <class 'tuple'>
        batch: <class 'list'>
        metrics: <class 'dict'>
        dataloader: <class 'monai.data.dataloader.DataLoader'>
        seed: <class 'NoneType'>
        times: <class 'dict'>
        metric_details: <class 'dict'>
```
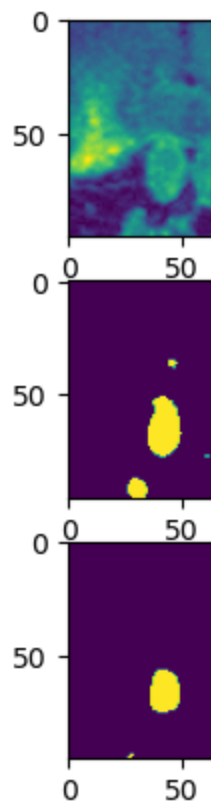
Prediction results.

In [18]:
```python
net, opt = get_model_and_optimizer(checkpoint_path="./save/problem1/exp1/net_checkpoint_
```
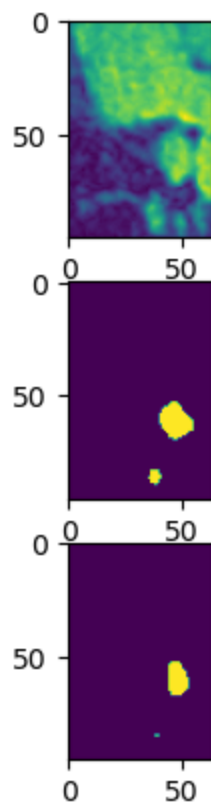
In [19]:
```python
sample_ids = [0, 3, 6, 9]
for sample_id in sample_ids:
    predict(net, val_ds[sample_id][0], val_ds[sample_id][1], sample_id=sample_id)
```
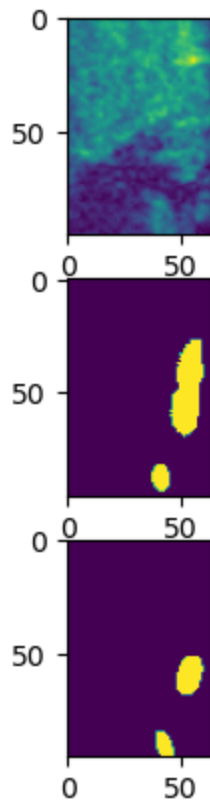
Input image #0 (top), predicted segmentation (middle), and ground truth segmentation (bottom)
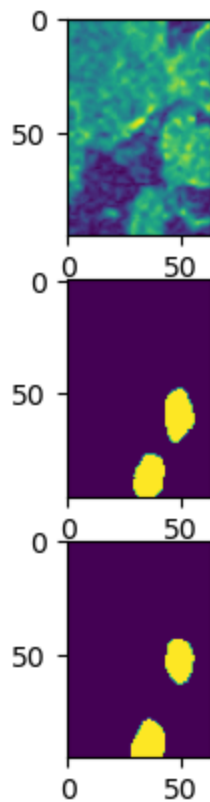

Input image #3 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #6 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #9 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Experiment 2: Lower learning rate (5e-4)

```
In [20]:  net, opt = get_model_and_optimizer(checkpoint_path=None, lr=5e-4)
```

```
In [21]:  trainer, evaluator = training(net, opt, loss_fn, val_metrics, val_loader, log_name="exp2
```

Start training.

```
In [22]:  max_epochs = 20
          state = trainer.run(train_loader, max_epochs)
```

```
2022-10-17 19:48:38,546 - Engine run starting with max_epochs=20.
2022-10-17 19:48:39,801 - Epoch: 1/20, Iter: 1/7 -- Loss: 1.0422
2022-10-17 19:48:39,903 - Epoch: 1/20, Iter: 2/7 -- Loss: 0.9709
2022-10-17 19:48:40,326 - Epoch: 1/20, Iter: 3/7 -- Loss: 0.9117
2022-10-17 19:48:40,395 - Epoch: 1/20, Iter: 4/7 -- Loss: 0.8458
2022-10-17 19:48:40,859 - Epoch: 1/20, Iter: 5/7 -- Loss: 0.8181
2022-10-17 19:48:40,946 - Epoch: 1/20, Iter: 6/7 -- Loss: 0.7813
2022-10-17 19:48:41,314 - Epoch: 1/20, Iter: 7/7 -- Loss: 0.8328
2022-10-17 19:48:41,503 - Engine run starting with max_epochs=1.
2022-10-17 19:48:53,501 - Epoch[1] Metrics -- asd: 9.9471 dice: 0.5536 hausdorff95: 25.7
986 jaccard: 0.3867
2022-10-17 19:48:53,872 - Epoch[1] Complete. Time taken: 00:00:12.088
2022-10-17 19:48:53,873 - Engine run complete. Time taken: 00:00:12.369
2022-10-17 19:48:54,089 - Epoch[1] Complete. Time taken: 00:00:15.269
2022-10-17 19:48:55,303 - Epoch: 2/20, Iter: 1/7 -- Loss: 0.7772
2022-10-17 19:48:55,375 - Epoch: 2/20, Iter: 2/7 -- Loss: 0.6818
2022-10-17 19:48:55,806 - Epoch: 2/20, Iter: 3/7 -- Loss: 0.7078
2022-10-17 19:48:56,062 - Epoch: 2/20, Iter: 4/7 -- Loss: 0.7051
2022-10-17 19:48:56,306 - Epoch: 2/20, Iter: 5/7 -- Loss: 0.7007
2022-10-17 19:48:56,490 - Epoch: 2/20, Iter: 6/7 -- Loss: 0.6862
2022-10-17 19:48:56,788 - Epoch: 2/20, Iter: 7/7 -- Loss: 0.7062
2022-10-17 19:48:56,985 - Engine run starting with max_epochs=1.
2022-10-17 19:49:08,671 - Epoch[2] Metrics -- asd: 8.6460 dice: 0.6330 hausdorff95: 22.9
297 jaccard: 0.4689
2022-10-17 19:49:09,071 - Epoch[1] Complete. Time taken: 00:00:11.849
2022-10-17 19:49:09,073 - Engine run complete. Time taken: 00:00:12.086
2022-10-17 19:49:09,280 - Epoch[2] Complete. Time taken: 00:00:15.187
2022-10-17 19:49:10,522 - Epoch: 3/20, Iter: 1/7 -- Loss: 0.6685
2022-10-17 19:49:10,609 - Epoch: 3/20, Iter: 2/7 -- Loss: 0.6048
2022-10-17 19:49:11,021 - Epoch: 3/20, Iter: 3/7 -- Loss: 0.6265
2022-10-17 19:49:11,113 - Epoch: 3/20, Iter: 4/7 -- Loss: 0.6268
2022-10-17 19:49:11,615 - Epoch: 3/20, Iter: 5/7 -- Loss: 0.5791
2022-10-17 19:49:11,721 - Epoch: 3/20, Iter: 6/7 -- Loss: 0.6409
2022-10-17 19:49:12,175 - Epoch: 3/20, Iter: 7/7 -- Loss: 0.6015
2022-10-17 19:49:12,369 - Engine run starting with max_epochs=1.
2022-10-17 19:49:24,687 - Epoch[3] Metrics -- asd: 7.9460 dice: 0.7226 hausdorff95: 22.0
288 jaccard: 0.5715
2022-10-17 19:49:25,177 - Epoch[1] Complete. Time taken: 00:00:12.554
2022-10-17 19:49:25,178 - Engine run complete. Time taken: 00:00:12.807
2022-10-17 19:49:25,384 - Epoch[3] Complete. Time taken: 00:00:16.100
2022-10-17 19:49:26,531 - Epoch: 4/20, Iter: 1/7 -- Loss: 0.5909
2022-10-17 19:49:26,750 - Epoch: 4/20, Iter: 2/7 -- Loss: 0.5385
2022-10-17 19:49:26,998 - Epoch: 4/20, Iter: 3/7 -- Loss: 0.5414
2022-10-17 19:49:27,195 - Epoch: 4/20, Iter: 4/7 -- Loss: 0.5539
2022-10-17 19:49:27,518 - Epoch: 4/20, Iter: 5/7 -- Loss: 0.5321
2022-10-17 19:49:27,698 - Epoch: 4/20, Iter: 6/7 -- Loss: 0.5379
2022-10-17 19:49:28,021 - Epoch: 4/20, Iter: 7/7 -- Loss: 0.5433
2022-10-17 19:49:28,246 - Engine run starting with max_epochs=1.
2022-10-17 19:49:40,090 - Epoch[4] Metrics -- asd: 7.4179 dice: 0.7634 hausdorff95: 21.8
201 jaccard: 0.6261
2022-10-17 19:49:40,442 - Epoch[1] Complete. Time taken: 00:00:11.918
2022-10-17 19:49:40,444 - Engine run complete. Time taken: 00:00:12.194
2022-10-17 19:49:40,595 - Epoch[4] Complete. Time taken: 00:00:15.207
2022-10-17 19:49:41,515 - Epoch: 5/20, Iter: 1/7 -- Loss: 0.5358
2022-10-17 19:49:41,725 - Epoch: 5/20, Iter: 2/7 -- Loss: 0.4604
2022-10-17 19:49:41,953 - Epoch: 5/20, Iter: 3/7 -- Loss: 0.4921
2022-10-17 19:49:42,168 - Epoch: 5/20, Iter: 4/7 -- Loss: 0.4931
2022-10-17 19:49:42,416 - Epoch: 5/20, Iter: 5/7 -- Loss: 0.4482
```

```
2022-10-17 19:49:42,521 - Epoch: 5/20, Iter: 6/7 -- Loss: 0.5040
2022-10-17 19:49:42,746 - Epoch: 5/20, Iter: 7/7 -- Loss: 0.4811
2022-10-17 19:49:42,952 - Engine run starting with max_epochs=1.
2022-10-17 19:49:51,716 - Epoch[5] Metrics -- asd: 6.4709 dice: 0.7921 hausdorff95: 19.9
193 jaccard: 0.6639
2022-10-17 19:49:51,948 - Epoch[1] Complete. Time taken: 00:00:08.762
2022-10-17 19:49:51,949 - Engine run complete. Time taken: 00:00:08.996
2022-10-17 19:49:52,075 - Epoch[5] Complete. Time taken: 00:00:11.478
2022-10-17 19:49:53,011 - Epoch: 6/20, Iter: 1/7 -- Loss: 0.4798
2022-10-17 19:49:53,148 - Epoch: 6/20, Iter: 2/7 -- Loss: 0.4084
2022-10-17 19:49:53,488 - Epoch: 6/20, Iter: 3/7 -- Loss: 0.4373
2022-10-17 19:49:53,653 - Epoch: 6/20, Iter: 4/7 -- Loss: 0.4491
2022-10-17 19:49:53,998 - Epoch: 6/20, Iter: 5/7 -- Loss: 0.4086
2022-10-17 19:49:54,145 - Epoch: 6/20, Iter: 6/7 -- Loss: 0.4307
2022-10-17 19:49:54,496 - Epoch: 6/20, Iter: 7/7 -- Loss: 0.4187
2022-10-17 19:49:54,701 - Engine run starting with max_epochs=1.
2022-10-17 19:50:04,448 - Epoch[6] Metrics -- asd: 6.0377 dice: 0.8001 hausdorff95: 18.2
973 jaccard: 0.6758
2022-10-17 19:50:04,689 - Epoch[1] Complete. Time taken: 00:00:09.754
2022-10-17 19:50:04,690 - Engine run complete. Time taken: 00:00:09.988
2022-10-17 19:50:04,812 - Epoch[6] Complete. Time taken: 00:00:12.737
2022-10-17 19:50:05,518 - Epoch: 7/20, Iter: 1/7 -- Loss: 0.4393
2022-10-17 19:50:05,605 - Epoch: 7/20, Iter: 2/7 -- Loss: 0.3566
2022-10-17 19:50:05,807 - Epoch: 7/20, Iter: 3/7 -- Loss: 0.3832
2022-10-17 19:50:05,907 - Epoch: 7/20, Iter: 4/7 -- Loss: 0.3885
2022-10-17 19:50:06,111 - Epoch: 7/20, Iter: 5/7 -- Loss: 0.3540
2022-10-17 19:50:06,194 - Epoch: 7/20, Iter: 6/7 -- Loss: 0.3666
2022-10-17 19:50:06,397 - Epoch: 7/20, Iter: 7/7 -- Loss: 0.3697
2022-10-17 19:50:06,522 - Engine run starting with max_epochs=1.
2022-10-17 19:50:12,966 - Epoch[7] Metrics -- asd: 5.3073 dice: 0.8167 hausdorff95: 17.1
831 jaccard: 0.6975
2022-10-17 19:50:13,178 - Epoch[1] Complete. Time taken: 00:00:06.502
2022-10-17 19:50:13,179 - Engine run complete. Time taken: 00:00:06.657
2022-10-17 19:50:13,274 - Epoch[7] Complete. Time taken: 00:00:08.460
2022-10-17 19:50:13,903 - Epoch: 8/20, Iter: 1/7 -- Loss: 0.3926
2022-10-17 19:50:13,954 - Epoch: 8/20, Iter: 2/7 -- Loss: 0.3064
2022-10-17 19:50:14,177 - Epoch: 8/20, Iter: 3/7 -- Loss: 0.3396
2022-10-17 19:50:14,227 - Epoch: 8/20, Iter: 4/7 -- Loss: 0.3459
2022-10-17 19:50:14,445 - Epoch: 8/20, Iter: 5/7 -- Loss: 0.3050
2022-10-17 19:50:14,501 - Epoch: 8/20, Iter: 6/7 -- Loss: 0.3193
2022-10-17 19:50:14,682 - Epoch: 8/20, Iter: 7/7 -- Loss: 0.3341
2022-10-17 19:50:14,828 - Engine run starting with max_epochs=1.
2022-10-17 19:50:21,553 - Epoch[8] Metrics -- asd: 4.4390 dice: 0.8280 hausdorff95: 14.6
327 jaccard: 0.7122
2022-10-17 19:50:21,755 - Epoch[1] Complete. Time taken: 00:00:06.761
2022-10-17 19:50:21,756 - Engine run complete. Time taken: 00:00:06.927
2022-10-17 19:50:21,861 - Epoch[8] Complete. Time taken: 00:00:08.586
2022-10-17 19:50:22,558 - Epoch: 9/20, Iter: 1/7 -- Loss: 0.3563
2022-10-17 19:50:22,611 - Epoch: 9/20, Iter: 2/7 -- Loss: 0.2662
2022-10-17 19:50:22,802 - Epoch: 9/20, Iter: 3/7 -- Loss: 0.2959
2022-10-17 19:50:22,853 - Epoch: 9/20, Iter: 4/7 -- Loss: 0.3092
2022-10-17 19:50:23,089 - Epoch: 9/20, Iter: 5/7 -- Loss: 0.2770
2022-10-17 19:50:23,139 - Epoch: 9/20, Iter: 6/7 -- Loss: 0.2729
2022-10-17 19:50:23,346 - Epoch: 9/20, Iter: 7/7 -- Loss: 0.2984
2022-10-17 19:50:23,490 - Engine run starting with max_epochs=1.
2022-10-17 19:50:33,106 - Epoch[9] Metrics -- asd: 4.2022 dice: 0.8354 hausdorff95: 14.2
339 jaccard: 0.7234
2022-10-17 19:50:33,457 - Epoch[1] Complete. Time taken: 00:00:09.799
2022-10-17 19:50:33,458 - Engine run complete. Time taken: 00:00:09.967
2022-10-17 19:50:33,588 - Epoch[9] Complete. Time taken: 00:00:11.725
2022-10-17 19:50:34,562 - Epoch: 10/20, Iter: 1/7 -- Loss: 0.3343
2022-10-17 19:50:34,631 - Epoch: 10/20, Iter: 2/7 -- Loss: 0.2319
2022-10-17 19:50:35,056 - Epoch: 10/20, Iter: 3/7 -- Loss: 0.2501
2022-10-17 19:50:35,111 - Epoch: 10/20, Iter: 4/7 -- Loss: 0.2901
2022-10-17 19:50:35,539 - Epoch: 10/20, Iter: 5/7 -- Loss: 0.2306
2022-10-17 19:50:35,606 - Epoch: 10/20, Iter: 6/7 -- Loss: 0.2601
```

```
2022-10-17 19:50:35,925 - Epoch: 10/20, Iter: 7/7 -- Loss: 0.2470
2022-10-17 19:50:36,134 - Engine run starting with max_epochs=1.
2022-10-17 19:50:45,934 - Epoch[10] Metrics -- asd: 4.4667 dice: 0.8342 hausdorff95: 15.
1694 jaccard: 0.7233
2022-10-17 19:50:46,285 - Epoch[1] Complete. Time taken: 00:00:09.898
2022-10-17 19:50:46,287 - Engine run complete. Time taken: 00:00:10.151
2022-10-17 19:50:46,418 - Epoch[10] Complete. Time taken: 00:00:12.829
2022-10-17 19:50:47,364 - Epoch: 11/20, Iter: 1/7 -- Loss: 0.3056
2022-10-17 19:50:47,448 - Epoch: 11/20, Iter: 2/7 -- Loss: 0.1824
2022-10-17 19:50:47,797 - Epoch: 11/20, Iter: 3/7 -- Loss: 0.2290
2022-10-17 19:50:47,900 - Epoch: 11/20, Iter: 4/7 -- Loss: 0.2512
2022-10-17 19:50:48,261 - Epoch: 11/20, Iter: 5/7 -- Loss: 0.2005
2022-10-17 19:50:48,339 - Epoch: 11/20, Iter: 6/7 -- Loss: 0.2421
2022-10-17 19:50:48,736 - Epoch: 11/20, Iter: 7/7 -- Loss: 0.2147
2022-10-17 19:50:48,931 - Engine run starting with max_epochs=1.
2022-10-17 19:50:56,929 - Epoch[11] Metrics -- asd: 4.7482 dice: 0.8335 hausdorff95: 17.
0675 jaccard: 0.7186
2022-10-17 19:50:57,105 - Epoch[1] Complete. Time taken: 00:00:07.942
2022-10-17 19:50:57,106 - Engine run complete. Time taken: 00:00:08.174
2022-10-17 19:50:57,208 - Epoch[11] Complete. Time taken: 00:00:10.789
2022-10-17 19:50:57,859 - Epoch: 12/20, Iter: 1/7 -- Loss: 0.2842
2022-10-17 19:50:57,908 - Epoch: 12/20, Iter: 2/7 -- Loss: 0.1693
2022-10-17 19:50:58,118 - Epoch: 12/20, Iter: 3/7 -- Loss: 0.1945
2022-10-17 19:50:58,164 - Epoch: 12/20, Iter: 4/7 -- Loss: 0.2201
2022-10-17 19:50:58,385 - Epoch: 12/20, Iter: 5/7 -- Loss: 0.1804
2022-10-17 19:50:58,430 - Epoch: 12/20, Iter: 6/7 -- Loss: 0.1874
2022-10-17 19:50:58,800 - Epoch: 12/20, Iter: 7/7 -- Loss: 0.2168
2022-10-17 19:50:59,094 - Engine run starting with max_epochs=1.
2022-10-17 19:51:05,227 - Epoch[12] Metrics -- asd: 4.2847 dice: 0.8304 hausdorff95: 14.
1374 jaccard: 0.7179
2022-10-17 19:51:05,446 - Epoch[1] Complete. Time taken: 00:00:06.125
2022-10-17 19:51:05,447 - Engine run complete. Time taken: 00:00:06.352
2022-10-17 19:51:05,557 - Epoch[12] Complete. Time taken: 00:00:08.348
2022-10-17 19:51:06,270 - Epoch: 13/20, Iter: 1/7 -- Loss: 0.2673
2022-10-17 19:51:06,327 - Epoch: 13/20, Iter: 2/7 -- Loss: 0.1360
2022-10-17 19:51:06,503 - Epoch: 13/20, Iter: 3/7 -- Loss: 0.1610
2022-10-17 19:51:06,556 - Epoch: 13/20, Iter: 4/7 -- Loss: 0.1847
2022-10-17 19:51:06,771 - Epoch: 13/20, Iter: 5/7 -- Loss: 0.1350
2022-10-17 19:51:06,827 - Epoch: 13/20, Iter: 6/7 -- Loss: 0.1464
2022-10-17 19:51:07,020 - Epoch: 13/20, Iter: 7/7 -- Loss: 0.1634
2022-10-17 19:51:07,180 - Engine run starting with max_epochs=1.
2022-10-17 19:51:17,302 - Epoch[13] Metrics -- asd: 3.7945 dice: 0.8497 hausdorff95: 13.
5225 jaccard: 0.7444
2022-10-17 19:51:17,795 - Epoch[1] Complete. Time taken: 00:00:10.449
2022-10-17 19:51:17,796 - Engine run complete. Time taken: 00:00:10.615
2022-10-17 19:51:18,045 - Epoch[13] Complete. Time taken: 00:00:12.487
2022-10-17 19:51:19,142 - Epoch: 14/20, Iter: 1/7 -- Loss: 0.2252
2022-10-17 19:51:19,220 - Epoch: 14/20, Iter: 2/7 -- Loss: 0.0901
2022-10-17 19:51:19,687 - Epoch: 14/20, Iter: 3/7 -- Loss: 0.1211
2022-10-17 19:51:19,780 - Epoch: 14/20, Iter: 4/7 -- Loss: 0.1593
2022-10-17 19:51:20,267 - Epoch: 14/20, Iter: 5/7 -- Loss: 0.1100
2022-10-17 19:51:20,341 - Epoch: 14/20, Iter: 6/7 -- Loss: 0.1195
2022-10-17 19:51:20,892 - Epoch: 14/20, Iter: 7/7 -- Loss: 0.1353
2022-10-17 19:51:21,130 - Engine run starting with max_epochs=1.
2022-10-17 19:51:32,327 - Epoch[14] Metrics -- asd: 3.8667 dice: 0.8576 hausdorff95: 14.
4670 jaccard: 0.7565
2022-10-17 19:51:32,832 - Epoch[1] Complete. Time taken: 00:00:11.432
2022-10-17 19:51:32,834 - Engine run complete. Time taken: 00:00:11.703
2022-10-17 19:51:33,001 - Epoch[14] Complete. Time taken: 00:00:14.955
2022-10-17 19:51:34,121 - Epoch: 15/20, Iter: 1/7 -- Loss: 0.2065
2022-10-17 19:51:34,267 - Epoch: 15/20, Iter: 2/7 -- Loss: 0.0635
2022-10-17 19:51:34,654 - Epoch: 15/20, Iter: 3/7 -- Loss: 0.0957
2022-10-17 19:51:34,836 - Epoch: 15/20, Iter: 4/7 -- Loss: 0.1362
2022-10-17 19:51:35,287 - Epoch: 15/20, Iter: 5/7 -- Loss: 0.0842
2022-10-17 19:51:35,344 - Epoch: 15/20, Iter: 6/7 -- Loss: 0.0925
2022-10-17 19:51:35,866 - Epoch: 15/20, Iter: 7/7 -- Loss: 0.1126
```

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2022-10-17 19:51:36,216 - Engine run starting with max_epochs=1.
2022-10-17 19:51:47,040 - Epoch[15] Metrics -- asd: 3.6900 dice: 0.8548 hausdorff95: 13.
4995 jaccard: 0.7525
2022-10-17 19:51:47,472 - Epoch[1] Complete. Time taken: 00:00:10.964
2022-10-17 19:51:47,473 - Engine run complete. Time taken: 00:00:11.255
2022-10-17 19:51:47,653 - Epoch[15] Complete. Time taken: 00:00:14.651
2022-10-17 19:51:48,884 - Epoch: 16/20, Iter: 1/7 -- Loss: 0.1825
2022-10-17 19:51:48,980 - Epoch: 16/20, Iter: 2/7 -- Loss: 0.0333
2022-10-17 19:51:49,429 - Epoch: 16/20, Iter: 3/7 -- Loss: 0.0748
2022-10-17 19:51:49,619 - Epoch: 16/20, Iter: 4/7 -- Loss: 0.1196
2022-10-17 19:51:50,018 - Epoch: 16/20, Iter: 5/7 -- Loss: 0.0680
2022-10-17 19:51:50,460 - Epoch: 16/20, Iter: 6/7 -- Loss: 0.0551
2022-10-17 19:51:50,535 - Epoch: 16/20, Iter: 7/7 -- Loss: 0.0912
2022-10-17 19:51:51,173 - Engine run starting with max_epochs=1.
2022-10-17 19:52:01,483 - Epoch[16] Metrics -- asd: 4.1962 dice: 0.8368 hausdorff95: 15.
5611 jaccard: 0.7254
2022-10-17 19:52:01,813 - Epoch[1] Complete. Time taken: 00:00:10.308
2022-10-17 19:52:01,814 - Engine run complete. Time taken: 00:00:10.640
2022-10-17 19:52:02,032 - Epoch[16] Complete. Time taken: 00:00:14.377
2022-10-17 19:52:03,532 - Epoch: 17/20, Iter: 1/7 -- Loss: 0.1724
2022-10-17 19:52:03,691 - Epoch: 17/20, Iter: 2/7 -- Loss: 0.0397
2022-10-17 19:52:04,183 - Epoch: 17/20, Iter: 3/7 -- Loss: 0.0379
2022-10-17 19:52:04,274 - Epoch: 17/20, Iter: 4/7 -- Loss: 0.0872
2022-10-17 19:52:04,973 - Epoch: 17/20, Iter: 5/7 -- Loss: 0.0555
2022-10-17 19:52:05,030 - Epoch: 17/20, Iter: 6/7 -- Loss: 0.0460
2022-10-17 19:52:05,441 - Epoch: 17/20, Iter: 7/7 -- Loss: 0.1006
2022-10-17 19:52:05,740 - Engine run starting with max_epochs=1.
2022-10-17 19:52:16,849 - Epoch[17] Metrics -- asd: 3.9311 dice: 0.8519 hausdorff95: 14.
8851 jaccard: 0.7484
2022-10-17 19:52:17,235 - Epoch[1] Complete. Time taken: 00:00:11.211
2022-10-17 19:52:17,237 - Engine run complete. Time taken: 00:00:11.495
2022-10-17 19:52:17,504 - Epoch[17] Complete. Time taken: 00:00:15.472
2022-10-17 19:52:18,748 - Epoch: 18/20, Iter: 1/7 -- Loss: 0.1731
2022-10-17 19:52:18,848 - Epoch: 18/20, Iter: 2/7 -- Loss: -0.0030
2022-10-17 19:52:19,273 - Epoch: 18/20, Iter: 3/7 -- Loss: 0.0286
2022-10-17 19:52:19,398 - Epoch: 18/20, Iter: 4/7 -- Loss: 0.0898
2022-10-17 19:52:19,774 - Epoch: 18/20, Iter: 5/7 -- Loss: 0.0318
2022-10-17 19:52:19,899 - Epoch: 18/20, Iter: 6/7 -- Loss: 0.0189
2022-10-17 19:52:20,284 - Epoch: 18/20, Iter: 7/7 -- Loss: 0.0599
2022-10-17 19:52:20,600 - Engine run starting with max_epochs=1.
2022-10-17 19:52:31,648 - Epoch[18] Metrics -- asd: 3.6298 dice: 0.8578 hausdorff95: 13.
8978 jaccard: 0.7555
2022-10-17 19:52:32,017 - Epoch[1] Complete. Time taken: 00:00:11.124
2022-10-17 19:52:32,019 - Engine run complete. Time taken: 00:00:11.400
2022-10-17 19:52:32,207 - Epoch[18] Complete. Time taken: 00:00:14.702
2022-10-17 19:52:33,360 - Epoch: 19/20, Iter: 1/7 -- Loss: 0.1378
2022-10-17 19:52:33,719 - Epoch: 19/20, Iter: 2/7 -- Loss: -0.0135
2022-10-17 19:52:33,816 - Epoch: 19/20, Iter: 3/7 -- Loss: 0.0139
2022-10-17 19:52:34,364 - Epoch: 19/20, Iter: 4/7 -- Loss: 0.0811
2022-10-17 19:52:34,484 - Epoch: 19/20, Iter: 5/7 -- Loss: -0.0004
2022-10-17 19:52:34,961 - Epoch: 19/20, Iter: 6/7 -- Loss: 0.0095
2022-10-17 19:52:35,072 - Epoch: 19/20, Iter: 7/7 -- Loss: 0.0537
2022-10-17 19:52:35,284 - Engine run starting with max_epochs=1.
2022-10-17 19:52:46,921 - Epoch[19] Metrics -- asd: 3.9924 dice: 0.8398 hausdorff95: 15.
2679 jaccard: 0.7296
2022-10-17 19:52:47,254 - Epoch[1] Complete. Time taken: 00:00:11.674
2022-10-17 19:52:47,255 - Engine run complete. Time taken: 00:00:11.970
2022-10-17 19:52:47,470 - Epoch[19] Complete. Time taken: 00:00:15.259
2022-10-17 19:52:48,788 - Epoch: 20/20, Iter: 1/7 -- Loss: 0.1370
2022-10-17 19:52:49,120 - Epoch: 20/20, Iter: 2/7 -- Loss: -0.0392
2022-10-17 19:52:49,222 - Epoch: 20/20, Iter: 3/7 -- Loss: -0.0240
2022-10-17 19:52:49,719 - Epoch: 20/20, Iter: 4/7 -- Loss: 0.0323
2022-10-17 19:52:49,824 - Epoch: 20/20, Iter: 5/7 -- Loss: -0.0111
2022-10-17 19:52:50,132 - Epoch: 20/20, Iter: 6/7 -- Loss: -0.0197
2022-10-17 19:52:50,261 - Epoch: 20/20, Iter: 7/7 -- Loss: 0.0201
2022-10-17 19:52:50,485 - Engine run starting with max_epochs=1.
```

```
2022-10-17 19:53:01,278 - Epoch[20] Metrics -- asd: 3.3440 dice: 0.8603 hausdorff95: 12.
1556 jaccard: 0.7602
2022-10-17 19:53:01,606 - Epoch[1] Complete. Time taken: 00:00:10.852
2022-10-17 19:53:01,607 - Engine run complete. Time taken: 00:00:11.120
2022-10-17 19:53:01,872 - Epoch[20] Complete. Time taken: 00:00:14.398
2022-10-17 19:53:01,874 - Engine run complete. Time taken: 00:04:23.317
```

Output the eval performance.

```
In [23]:  evaluator.run(val_loader)
```

```
2022-10-17 19:54:50,362 - Engine run starting with max_epochs=1.
2022-10-17 19:55:00,640 - Epoch[20] Metrics -- asd: 3.3440 dice: 0.8603 hausdorff95: 12.
1556 jaccard: 0.7602
2022-10-17 19:55:00,980 - Epoch[1] Complete. Time taken: 00:00:10.363
2022-10-17 19:55:00,982 - Engine run complete. Time taken: 00:00:10.617
```
Out[23]:
```
State:
        iteration: 10
        epoch: 1
        epoch_length: 10
        max_epochs: 1
        output: <class 'tuple'>
        batch: <class 'list'>
        metrics: <class 'dict'>
        dataloader: <class 'monai.data.dataloader.DataLoader'>
        seed: <class 'NoneType'>
        times: <class 'dict'>
        metric_details: <class 'dict'>
```
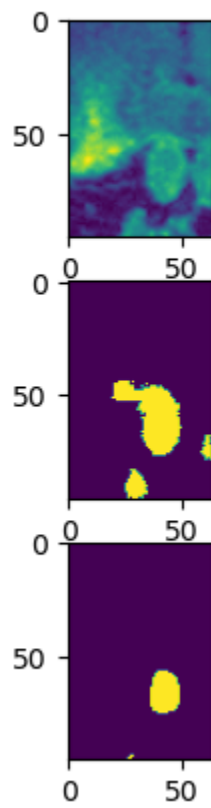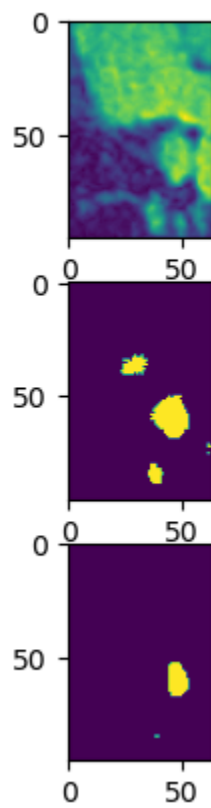
Prediction results.

```
In [24]:  net, opt = get_model_and_optimizer(checkpoint_path="./save/problem1/exp2/net_checkpoint_
```

```
In [25]:  sample_ids = [0, 3, 6, 9]
          for sample_id in sample_ids:
              predict(net, val_ds[sample_id][0], val_ds[sample_id][1], sample_id=sample_id)
```
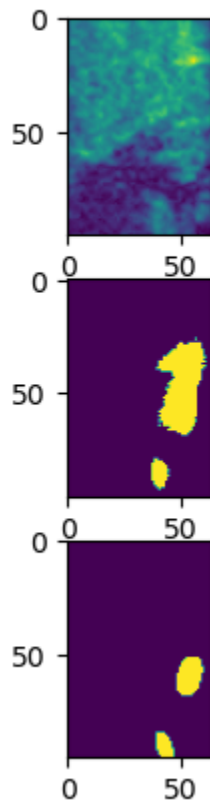
Input image #0 (top), predicted segmentation (middle), and ground truth segmentation (bottom)
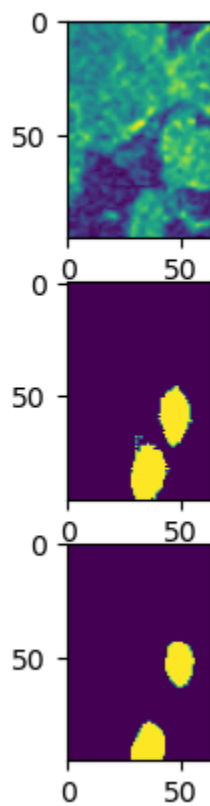

Input image #3 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #6 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #9 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Experiment 3: Higher learning rate (`5e-3`)

```
In [32]:  net, opt = get_model_and_optimizer(checkpoint_path=None, lr=5e-3)
```

```
In [33]:  trainer, evaluator = training(net, opt, loss_fn, val_metrics, val_loader, log_name="exp3
```

Start training.

```
In [34]:  max_epochs = 40
          state = trainer.run(train_loader, max_epochs)
```

```
2022-10-17 20:07:49,903 - Engine run starting with max_epochs=40.
2022-10-17 20:07:50,896 - Epoch: 1/40, Iter: 1/7 -- Loss: 0.9964
2022-10-17 20:07:50,965 - Epoch: 1/40, Iter: 2/7 -- Loss: 0.7683
2022-10-17 20:07:51,280 - Epoch: 1/40, Iter: 3/7 -- Loss: 0.6600
2022-10-17 20:07:51,457 - Epoch: 1/40, Iter: 4/7 -- Loss: 0.5656
2022-10-17 20:07:51,723 - Epoch: 1/40, Iter: 5/7 -- Loss: 0.6677
2022-10-17 20:07:51,963 - Epoch: 1/40, Iter: 6/7 -- Loss: 0.5316
2022-10-17 20:07:52,119 - Epoch: 1/40, Iter: 7/7 -- Loss: 0.7053
2022-10-17 20:07:52,302 - Engine run starting with max_epochs=1.
2022-10-17 20:08:02,804 - Epoch[1] Metrics -- asd: 11.0541 dice: 0.6237 hausdorff95: 28.
6700 jaccard: 0.4663
2022-10-17 20:08:03,142 - Epoch[1] Complete. Time taken: 00:00:10.578
2022-10-17 20:08:03,144 - Engine run complete. Time taken: 00:00:10.841
2022-10-17 20:08:03,272 - Epoch[1] Complete. Time taken: 00:00:13.116
2022-10-17 20:08:04,258 - Epoch: 2/40, Iter: 1/7 -- Loss: 0.5908
2022-10-17 20:08:04,369 - Epoch: 2/40, Iter: 2/7 -- Loss: 0.3404
2022-10-17 20:08:04,752 - Epoch: 2/40, Iter: 3/7 -- Loss: 0.4162
2022-10-17 20:08:04,866 - Epoch: 2/40, Iter: 4/7 -- Loss: 0.3725
2022-10-17 20:08:05,238 - Epoch: 2/40, Iter: 5/7 -- Loss: 0.4403
2022-10-17 20:08:05,285 - Epoch: 2/40, Iter: 6/7 -- Loss: 0.3075
2022-10-17 20:08:05,644 - Epoch: 2/40, Iter: 7/7 -- Loss: 0.4539
2022-10-17 20:08:05,838 - Engine run starting with max_epochs=1.
2022-10-17 20:08:16,621 - Epoch[2] Metrics -- asd: 10.2787 dice: 0.6752 hausdorff95: 29.
2477 jaccard: 0.5181
2022-10-17 20:08:16,936 - Epoch[1] Complete. Time taken: 00:00:10.859
2022-10-17 20:08:16,937 - Engine run complete. Time taken: 00:00:11.098
2022-10-17 20:08:17,065 - Epoch[2] Complete. Time taken: 00:00:13.789
2022-10-17 20:08:17,955 - Epoch: 3/40, Iter: 1/7 -- Loss: 0.5408
2022-10-17 20:08:18,018 - Epoch: 3/40, Iter: 2/7 -- Loss: 0.1979
2022-10-17 20:08:18,461 - Epoch: 3/40, Iter: 3/7 -- Loss: 0.1760
2022-10-17 20:08:18,529 - Epoch: 3/40, Iter: 4/7 -- Loss: 0.2159
2022-10-17 20:08:18,803 - Epoch: 3/40, Iter: 5/7 -- Loss: 0.3051
2022-10-17 20:08:18,876 - Epoch: 3/40, Iter: 6/7 -- Loss: 0.2092
2022-10-17 20:08:19,115 - Epoch: 3/40, Iter: 7/7 -- Loss: 0.3227
2022-10-17 20:08:19,255 - Engine run starting with max_epochs=1.
2022-10-17 20:08:26,645 - Epoch[3] Metrics -- asd: 8.4830 dice: 0.6817 hausdorff95: 24.3
513 jaccard: 0.5324
2022-10-17 20:08:26,817 - Epoch[1] Complete. Time taken: 00:00:07.397
2022-10-17 20:08:26,818 - Engine run complete. Time taken: 00:00:07.562
2022-10-17 20:08:26,920 - Epoch[3] Complete. Time taken: 00:00:09.854
2022-10-17 20:08:27,566 - Epoch: 4/40, Iter: 1/7 -- Loss: 0.2775
2022-10-17 20:08:27,627 - Epoch: 4/40, Iter: 2/7 -- Loss: -0.0398
2022-10-17 20:08:27,887 - Epoch: 4/40, Iter: 3/7 -- Loss: -0.0501
2022-10-17 20:08:27,941 - Epoch: 4/40, Iter: 4/7 -- Loss: 0.0203
2022-10-17 20:08:28,220 - Epoch: 4/40, Iter: 5/7 -- Loss: -0.0343
2022-10-17 20:08:28,274 - Epoch: 4/40, Iter: 6/7 -- Loss: -0.1066
2022-10-17 20:08:28,494 - Epoch: 4/40, Iter: 7/7 -- Loss: 0.0569
2022-10-17 20:08:28,648 - Engine run starting with max_epochs=1.
2022-10-17 20:08:37,266 - Epoch[4] Metrics -- asd: 7.1780 dice: 0.7463 hausdorff95: 23.0
845 jaccard: 0.6036
2022-10-17 20:08:37,623 - Epoch[1] Complete. Time taken: 00:00:08.799
2022-10-17 20:08:37,624 - Engine run complete. Time taken: 00:00:08.975
2022-10-17 20:08:37,842 - Epoch[4] Complete. Time taken: 00:00:10.921
2022-10-17 20:08:39,455 - Epoch: 5/40, Iter: 1/7 -- Loss: 0.1403
2022-10-17 20:08:39,557 - Epoch: 5/40, Iter: 2/7 -- Loss: -0.2755
2022-10-17 20:08:40,117 - Epoch: 5/40, Iter: 3/7 -- Loss: -0.2486
2022-10-17 20:08:40,223 - Epoch: 5/40, Iter: 4/7 -- Loss: -0.1588
2022-10-17 20:08:40,757 - Epoch: 5/40, Iter: 5/7 -- Loss: -0.1585
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2022-10-17 20:08:40,864 - Epoch: 5/40, Iter: 6/7 -- Loss: -0.1243
2022-10-17 20:08:41,366 - Epoch: 5/40, Iter: 7/7 -- Loss: -0.2179
2022-10-17 20:08:41,567 - Engine run starting with max_epochs=1.
2022-10-17 20:08:52,616 - Epoch[5] Metrics -- asd: 5.8326 dice: 0.7616 hausdorff95: 20.0
692 jaccard: 0.6246
2022-10-17 20:08:52,976 - Epoch[1] Complete. Time taken: 00:00:11.098
2022-10-17 20:08:52,978 - Engine run complete. Time taken: 00:00:11.407
2022-10-17 20:08:53,131 - Epoch[5] Complete. Time taken: 00:00:15.287
2022-10-17 20:08:54,354 - Epoch: 6/40, Iter: 1/7 -- Loss: -0.1642
2022-10-17 20:08:54,461 - Epoch: 6/40, Iter: 2/7 -- Loss: -0.4418
2022-10-17 20:08:54,843 - Epoch: 6/40, Iter: 3/7 -- Loss: -0.5286
2022-10-17 20:08:54,904 - Epoch: 6/40, Iter: 4/7 -- Loss: -0.4386
2022-10-17 20:08:55,391 - Epoch: 6/40, Iter: 5/7 -- Loss: -0.5324
2022-10-17 20:08:55,483 - Epoch: 6/40, Iter: 6/7 -- Loss: -0.4402
2022-10-17 20:08:55,860 - Epoch: 6/40, Iter: 7/7 -- Loss: -0.4869
2022-10-17 20:08:56,058 - Engine run starting with max_epochs=1.
2022-10-17 20:09:06,015 - Epoch[6] Metrics -- asd: 4.8054 dice: 0.7853 hausdorff95: 17.4
481 jaccard: 0.6539
2022-10-17 20:09:06,367 - Epoch[1] Complete. Time taken: 00:00:10.058
2022-10-17 20:09:06,369 - Engine run complete. Time taken: 00:00:10.309
2022-10-17 20:09:06,527 - Epoch[6] Complete. Time taken: 00:00:13.393
2022-10-17 20:09:07,749 - Epoch: 7/40, Iter: 1/7 -- Loss: -0.4227
2022-10-17 20:09:07,851 - Epoch: 7/40, Iter: 2/7 -- Loss: -0.8055
2022-10-17 20:09:08,205 - Epoch: 7/40, Iter: 3/7 -- Loss: -0.6928
2022-10-17 20:09:08,349 - Epoch: 7/40, Iter: 4/7 -- Loss: -0.6008
2022-10-17 20:09:08,736 - Epoch: 7/40, Iter: 5/7 -- Loss: -0.8333
2022-10-17 20:09:08,861 - Epoch: 7/40, Iter: 6/7 -- Loss: -0.6753
2022-10-17 20:09:09,324 - Epoch: 7/40, Iter: 7/7 -- Loss: -0.7670
2022-10-17 20:09:09,573 - Engine run starting with max_epochs=1.
2022-10-17 20:09:19,857 - Epoch[7] Metrics -- asd: 4.3920 dice: 0.7942 hausdorff95: 15.9
498 jaccard: 0.6640
2022-10-17 20:09:20,215 - Epoch[1] Complete. Time taken: 00:00:10.386
2022-10-17 20:09:20,216 - Engine run complete. Time taken: 00:00:10.641
2022-10-17 20:09:20,448 - Epoch[7] Complete. Time taken: 00:00:13.917
2022-10-17 20:09:21,644 - Epoch: 8/40, Iter: 1/7 -- Loss: -0.7344
2022-10-17 20:09:21,810 - Epoch: 8/40, Iter: 2/7 -- Loss: -0.9537
2022-10-17 20:09:22,262 - Epoch: 8/40, Iter: 3/7 -- Loss: -0.9725
2022-10-17 20:09:22,326 - Epoch: 8/40, Iter: 4/7 -- Loss: -0.8655
2022-10-17 20:09:22,883 - Epoch: 8/40, Iter: 5/7 -- Loss: -1.1177
2022-10-17 20:09:22,993 - Epoch: 8/40, Iter: 6/7 -- Loss: -0.7751
2022-10-17 20:09:23,457 - Epoch: 8/40, Iter: 7/7 -- Loss: -1.0096
2022-10-17 20:09:23,661 - Engine run starting with max_epochs=1.
2022-10-17 20:09:33,220 - Epoch[8] Metrics -- asd: 4.1262 dice: 0.7846 hausdorff95: 14.9
190 jaccard: 0.6518
2022-10-17 20:09:33,587 - Epoch[1] Complete. Time taken: 00:00:09.615
2022-10-17 20:09:33,588 - Engine run complete. Time taken: 00:00:09.925
2022-10-17 20:09:33,809 - Epoch[8] Complete. Time taken: 00:00:13.356
2022-10-17 20:09:35,054 - Epoch: 9/40, Iter: 1/7 -- Loss: -0.9853
2022-10-17 20:09:35,153 - Epoch: 9/40, Iter: 2/7 -- Loss: -1.2378
2022-10-17 20:09:35,643 - Epoch: 9/40, Iter: 3/7 -- Loss: -1.1169
2022-10-17 20:09:35,714 - Epoch: 9/40, Iter: 4/7 -- Loss: -1.0798
2022-10-17 20:09:36,225 - Epoch: 9/40, Iter: 5/7 -- Loss: -1.5377
2022-10-17 20:09:36,282 - Epoch: 9/40, Iter: 6/7 -- Loss: -1.0144
2022-10-17 20:09:36,767 - Epoch: 9/40, Iter: 7/7 -- Loss: -1.2920
2022-10-17 20:09:36,979 - Engine run starting with max_epochs=1.
2022-10-17 20:09:46,598 - Epoch[9] Metrics -- asd: 3.8228 dice: 0.8006 hausdorff95: 14.7
549 jaccard: 0.6722
2022-10-17 20:09:46,985 - Epoch[1] Complete. Time taken: 00:00:09.720
2022-10-17 20:09:46,986 - Engine run complete. Time taken: 00:00:10.005
2022-10-17 20:09:47,170 - Epoch[9] Complete. Time taken: 00:00:13.357
2022-10-17 20:09:48,382 - Epoch: 10/40, Iter: 1/7 -- Loss: -1.2631
2022-10-17 20:09:48,597 - Epoch: 10/40, Iter: 2/7 -- Loss: -1.5194
2022-10-17 20:09:48,890 - Epoch: 10/40, Iter: 3/7 -- Loss: -1.2728
2022-10-17 20:09:49,150 - Epoch: 10/40, Iter: 4/7 -- Loss: -1.3142
2022-10-17 20:09:49,326 - Epoch: 10/40, Iter: 5/7 -- Loss: -1.7955
2022-10-17 20:09:49,690 - Epoch: 10/40, Iter: 6/7 -- Loss: -1.1783
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2022-10-17 20:09:49,905 - Epoch: 10/40, Iter: 7/7 -- Loss: -1.4953
2022-10-17 20:09:50,107 - Engine run starting with max_epochs=1.
2022-10-17 20:09:59,591 - Epoch[10] Metrics -- asd: 3.5230 dice: 0.7994 hausdorff95: 13.
2846 jaccard: 0.6716
2022-10-17 20:09:59,929 - Epoch[1] Complete. Time taken: 00:00:09.566
2022-10-17 20:09:59,931 - Engine run complete. Time taken: 00:00:09.822
2022-10-17 20:10:00,104 - Epoch[10] Complete. Time taken: 00:00:12.930
2022-10-17 20:10:01,602 - Epoch: 11/40, Iter: 1/7 -- Loss: -1.5395
2022-10-17 20:10:01,845 - Epoch: 11/40, Iter: 2/7 -- Loss: -1.7062
2022-10-17 20:10:02,075 - Epoch: 11/40, Iter: 3/7 -- Loss: -1.4734
2022-10-17 20:10:02,373 - Epoch: 11/40, Iter: 4/7 -- Loss: -1.4076
2022-10-17 20:10:02,657 - Epoch: 11/40, Iter: 5/7 -- Loss: -1.8989
2022-10-17 20:10:02,813 - Epoch: 11/40, Iter: 6/7 -- Loss: -1.2911
2022-10-17 20:10:03,324 - Epoch: 11/40, Iter: 7/7 -- Loss: -1.7791
2022-10-17 20:10:03,571 - Engine run starting with max_epochs=1.
2022-10-17 20:10:12,826 - Epoch[11] Metrics -- asd: 3.8129 dice: 0.7594 hausdorff95: 14.
1735 jaccard: 0.6183
2022-10-17 20:10:13,216 - Epoch[1] Complete. Time taken: 00:00:09.360
2022-10-17 20:10:13,217 - Engine run complete. Time taken: 00:00:09.644
2022-10-17 20:10:13,461 - Epoch[11] Complete. Time taken: 00:00:13.354
2022-10-17 20:10:14,599 - Epoch: 12/40, Iter: 1/7 -- Loss: -1.7363
2022-10-17 20:10:14,807 - Epoch: 12/40, Iter: 2/7 -- Loss: -1.7789
2022-10-17 20:10:15,120 - Epoch: 12/40, Iter: 3/7 -- Loss: -1.4804
2022-10-17 20:10:15,329 - Epoch: 12/40, Iter: 4/7 -- Loss: -1.6416
2022-10-17 20:10:15,641 - Epoch: 12/40, Iter: 5/7 -- Loss: -2.0495
2022-10-17 20:10:15,871 - Epoch: 12/40, Iter: 6/7 -- Loss: -1.5041
2022-10-17 20:10:16,212 - Epoch: 12/40, Iter: 7/7 -- Loss: -2.0006
2022-10-17 20:10:16,417 - Engine run starting with max_epochs=1.
2022-10-17 20:10:25,724 - Epoch[12] Metrics -- asd: 4.1442 dice: 0.7255 hausdorff95: 16.
1994 jaccard: 0.5764
2022-10-17 20:10:26,047 - Epoch[1] Complete. Time taken: 00:00:09.355
2022-10-17 20:10:26,048 - Engine run complete. Time taken: 00:00:09.630
2022-10-17 20:10:26,274 - Epoch[12] Complete. Time taken: 00:00:12.811
2022-10-17 20:10:27,430 - Epoch: 13/40, Iter: 1/7 -- Loss: -1.9776
2022-10-17 20:10:27,510 - Epoch: 13/40, Iter: 2/7 -- Loss: -1.7427
2022-10-17 20:10:28,100 - Epoch: 13/40, Iter: 3/7 -- Loss: -1.4166
2022-10-17 20:10:28,196 - Epoch: 13/40, Iter: 4/7 -- Loss: -1.7484
2022-10-17 20:10:28,702 - Epoch: 13/40, Iter: 5/7 -- Loss: -2.0922
2022-10-17 20:10:28,753 - Epoch: 13/40, Iter: 6/7 -- Loss: -1.6323
2022-10-17 20:10:29,210 - Epoch: 13/40, Iter: 7/7 -- Loss: -2.0191
2022-10-17 20:10:29,491 - Engine run starting with max_epochs=1.
2022-10-17 20:10:39,326 - Epoch[13] Metrics -- asd: 4.0413 dice: 0.7472 hausdorff95: 15.
0574 jaccard: 0.6019
2022-10-17 20:10:39,651 - Epoch[1] Complete. Time taken: 00:00:09.875
2022-10-17 20:10:39,652 - Engine run complete. Time taken: 00:00:10.160
2022-10-17 20:10:39,866 - Epoch[13] Complete. Time taken: 00:00:13.589
2022-10-17 20:10:41,147 - Epoch: 14/40, Iter: 1/7 -- Loss: -2.0076
2022-10-17 20:10:41,267 - Epoch: 14/40, Iter: 2/7 -- Loss: -1.7749
2022-10-17 20:10:41,593 - Epoch: 14/40, Iter: 3/7 -- Loss: -1.6494
2022-10-17 20:10:41,736 - Epoch: 14/40, Iter: 4/7 -- Loss: -1.7468
2022-10-17 20:10:42,072 - Epoch: 14/40, Iter: 5/7 -- Loss: -2.2494
2022-10-17 20:10:42,232 - Epoch: 14/40, Iter: 6/7 -- Loss: -1.7120
2022-10-17 20:10:42,504 - Epoch: 14/40, Iter: 7/7 -- Loss: -2.1636
2022-10-17 20:10:42,744 - Engine run starting with max_epochs=1.
2022-10-17 20:10:50,516 - Epoch[14] Metrics -- asd: 4.1807 dice: 0.7529 hausdorff95: 14.
9768 jaccard: 0.6098
2022-10-17 20:10:50,829 - Epoch[1] Complete. Time taken: 00:00:07.825
2022-10-17 20:10:50,829 - Engine run complete. Time taken: 00:00:08.084
2022-10-17 20:10:50,943 - Epoch[14] Complete. Time taken: 00:00:11.073
2022-10-17 20:10:51,874 - Epoch: 15/40, Iter: 1/7 -- Loss: -2.2148
2022-10-17 20:10:51,934 - Epoch: 15/40, Iter: 2/7 -- Loss: -1.8589
2022-10-17 20:10:52,225 - Epoch: 15/40, Iter: 3/7 -- Loss: -1.6978
2022-10-17 20:10:52,418 - Epoch: 15/40, Iter: 4/7 -- Loss: -1.7994
2022-10-17 20:10:52,740 - Epoch: 15/40, Iter: 5/7 -- Loss: -2.3149
2022-10-17 20:10:52,891 - Epoch: 15/40, Iter: 6/7 -- Loss: -1.7257
2022-10-17 20:10:53,124 - Epoch: 15/40, Iter: 7/7 -- Loss: -2.3767
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2022-10-17 20:10:53,316 - Engine run starting with max_epochs=1.
2022-10-17 20:11:00,852 - Epoch[15] Metrics -- asd: 4.0775 dice: 0.7476 hausdorff95: 14.
5548 jaccard: 0.6038
2022-10-17 20:11:01,159 - Epoch[1] Complete. Time taken: 00:00:07.591
2022-10-17 20:11:01,160 - Engine run complete. Time taken: 00:00:07.843
2022-10-17 20:11:01,295 - Epoch[15] Complete. Time taken: 00:00:10.351
2022-10-17 20:11:02,294 - Epoch: 16/40, Iter: 1/7 -- Loss: -2.3943
2022-10-17 20:11:02,355 - Epoch: 16/40, Iter: 2/7 -- Loss: -1.7840
2022-10-17 20:11:02,591 - Epoch: 16/40, Iter: 3/7 -- Loss: -1.7480
2022-10-17 20:11:02,652 - Epoch: 16/40, Iter: 4/7 -- Loss: -1.8255
2022-10-17 20:11:02,917 - Epoch: 16/40, Iter: 5/7 -- Loss: -2.1008
2022-10-17 20:11:03,013 - Epoch: 16/40, Iter: 6/7 -- Loss: -1.5418
2022-10-17 20:11:03,246 - Epoch: 16/40, Iter: 7/7 -- Loss: -2.3127
2022-10-17 20:11:03,448 - Engine run starting with max_epochs=1.
2022-10-17 20:11:09,362 - Epoch[16] Metrics -- asd: 4.9155 dice: 0.6529 hausdorff95: 18.
9213 jaccard: 0.4943
2022-10-17 20:11:09,552 - Epoch[1] Complete. Time taken: 00:00:05.861
2022-10-17 20:11:09,553 - Engine run complete. Time taken: 00:00:06.103
2022-10-17 20:11:09,646 - Epoch[16] Complete. Time taken: 00:00:08.349
2022-10-17 20:11:10,474 - Epoch: 17/40, Iter: 1/7 -- Loss: -2.2086
2022-10-17 20:11:10,598 - Epoch: 17/40, Iter: 2/7 -- Loss: -1.8827
2022-10-17 20:11:10,784 - Epoch: 17/40, Iter: 3/7 -- Loss: -1.7433
2022-10-17 20:11:10,933 - Epoch: 17/40, Iter: 4/7 -- Loss: -1.7782
2022-10-17 20:11:11,221 - Epoch: 17/40, Iter: 5/7 -- Loss: -2.3496
2022-10-17 20:11:11,281 - Epoch: 17/40, Iter: 6/7 -- Loss: -1.7351
2022-10-17 20:11:11,475 - Epoch: 17/40, Iter: 7/7 -- Loss: -2.0934
2022-10-17 20:11:11,612 - Engine run starting with max_epochs=1.
2022-10-17 20:11:17,151 - Epoch[17] Metrics -- asd: 4.3606 dice: 0.7201 hausdorff95: 16.
2035 jaccard: 0.5686
2022-10-17 20:11:17,353 - Epoch[1] Complete. Time taken: 00:00:05.568
2022-10-17 20:11:17,354 - Engine run complete. Time taken: 00:00:05.741
2022-10-17 20:11:17,461 - Epoch[17] Complete. Time taken: 00:00:07.814
2022-10-17 20:11:18,120 - Epoch: 18/40, Iter: 1/7 -- Loss: -2.3447
2022-10-17 20:11:18,176 - Epoch: 18/40, Iter: 2/7 -- Loss: -1.8884
2022-10-17 20:11:18,371 - Epoch: 18/40, Iter: 3/7 -- Loss: -1.6290
2022-10-17 20:11:18,447 - Epoch: 18/40, Iter: 4/7 -- Loss: -1.8271
2022-10-17 20:11:18,618 - Epoch: 18/40, Iter: 5/7 -- Loss: -2.3458
2022-10-17 20:11:18,690 - Epoch: 18/40, Iter: 6/7 -- Loss: -1.6985
2022-10-17 20:11:18,946 - Epoch: 18/40, Iter: 7/7 -- Loss: -2.4699
2022-10-17 20:11:19,154 - Engine run starting with max_epochs=1.
2022-10-17 20:11:27,692 - Epoch[18] Metrics -- asd: 4.6720 dice: 0.6830 hausdorff95: 17.
3337 jaccard: 0.5243
2022-10-17 20:11:28,025 - Epoch[1] Complete. Time taken: 00:00:08.618
2022-10-17 20:11:28,026 - Engine run complete. Time taken: 00:00:08.871
2022-10-17 20:11:28,150 - Epoch[18] Complete. Time taken: 00:00:10.688
2022-10-17 20:11:29,036 - Epoch: 19/40, Iter: 1/7 -- Loss: -2.4035
2022-10-17 20:11:29,157 - Epoch: 19/40, Iter: 2/7 -- Loss: -1.9224
2022-10-17 20:11:29,465 - Epoch: 19/40, Iter: 3/7 -- Loss: -1.7297
2022-10-17 20:11:29,640 - Epoch: 19/40, Iter: 4/7 -- Loss: -1.8434
2022-10-17 20:11:29,950 - Epoch: 19/40, Iter: 5/7 -- Loss: -2.3180
2022-10-17 20:11:30,091 - Epoch: 19/40, Iter: 6/7 -- Loss: -1.7100
2022-10-17 20:11:30,420 - Epoch: 19/40, Iter: 7/7 -- Loss: -2.3997
2022-10-17 20:11:30,579 - Engine run starting with max_epochs=1.
2022-10-17 20:11:38,616 - Epoch[19] Metrics -- asd: 4.9865 dice: 0.6446 hausdorff95: 19.
5646 jaccard: 0.4821
2022-10-17 20:11:38,940 - Epoch[1] Complete. Time taken: 00:00:08.199
2022-10-17 20:11:38,941 - Engine run complete. Time taken: 00:00:08.361
2022-10-17 20:11:39,067 - Epoch[19] Complete. Time taken: 00:00:10.916
2022-10-17 20:11:40,046 - Epoch: 20/40, Iter: 1/7 -- Loss: -2.6573
2022-10-17 20:11:40,150 - Epoch: 20/40, Iter: 2/7 -- Loss: -1.9405
2022-10-17 20:11:40,487 - Epoch: 20/40, Iter: 3/7 -- Loss: -1.8350
2022-10-17 20:11:40,599 - Epoch: 20/40, Iter: 4/7 -- Loss: -1.8423
2022-10-17 20:11:40,984 - Epoch: 20/40, Iter: 5/7 -- Loss: -2.4098
2022-10-17 20:11:41,042 - Epoch: 20/40, Iter: 6/7 -- Loss: -1.8178
2022-10-17 20:11:41,466 - Epoch: 20/40, Iter: 7/7 -- Loss: -2.5675
2022-10-17 20:11:41,645 - Engine run starting with max_epochs=1.
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2022-10-17 20:11:49,279 - Epoch[20] Metrics -- asd: 4.9232 dice: 0.6674 hausdorff95: 17.
1776 jaccard: 0.5064
2022-10-17 20:11:49,467 - Epoch[1] Complete. Time taken: 00:00:07.604
2022-10-17 20:11:49,468 - Engine run complete. Time taken: 00:00:07.822
2022-10-17 20:11:49,592 - Epoch[20] Complete. Time taken: 00:00:10.524
2022-10-17 20:11:50,372 - Epoch: 21/40, Iter: 1/7 -- Loss: -2.7796
2022-10-17 20:11:50,680 - Epoch: 21/40, Iter: 2/7 -- Loss: -1.9282
2022-10-17 20:11:50,821 - Epoch: 21/40, Iter: 3/7 -- Loss: -1.7935
2022-10-17 20:11:51,115 - Epoch: 21/40, Iter: 4/7 -- Loss: -1.9087
2022-10-17 20:11:51,251 - Epoch: 21/40, Iter: 5/7 -- Loss: -2.3932
2022-10-17 20:11:51,634 - Epoch: 21/40, Iter: 6/7 -- Loss: -1.8055
2022-10-17 20:11:51,749 - Epoch: 21/40, Iter: 7/7 -- Loss: -2.5284
2022-10-17 20:11:51,932 - Engine run starting with max_epochs=1.
2022-10-17 20:11:57,950 - Epoch[21] Metrics -- asd: 5.0658 dice: 0.6472 hausdorff95: 18.
4683 jaccard: 0.4849
2022-10-17 20:11:58,135 - Epoch[1] Complete. Time taken: 00:00:06.034
2022-10-17 20:11:58,136 - Engine run complete. Time taken: 00:00:06.202
2022-10-17 20:11:58,283 - Epoch[21] Complete. Time taken: 00:00:08.691
2022-10-17 20:11:58,988 - Epoch: 22/40, Iter: 1/7 -- Loss: -2.9688
2022-10-17 20:11:59,036 - Epoch: 22/40, Iter: 2/7 -- Loss: -1.9596
2022-10-17 20:11:59,273 - Epoch: 22/40, Iter: 3/7 -- Loss: -1.8440
2022-10-17 20:11:59,326 - Epoch: 22/40, Iter: 4/7 -- Loss: -1.9734
2022-10-17 20:11:59,518 - Epoch: 22/40, Iter: 5/7 -- Loss: -2.4824
2022-10-17 20:11:59,591 - Epoch: 22/40, Iter: 6/7 -- Loss: -1.8190
2022-10-17 20:11:59,816 - Epoch: 22/40, Iter: 7/7 -- Loss: -2.6801
2022-10-17 20:11:59,945 - Engine run starting with max_epochs=1.
2022-10-17 20:12:05,409 - Epoch[22] Metrics -- asd: 5.0436 dice: 0.6708 hausdorff95: 16.
7968 jaccard: 0.5102
2022-10-17 20:12:05,728 - Epoch[1] Complete. Time taken: 00:00:05.626
2022-10-17 20:12:05,730 - Engine run complete. Time taken: 00:00:05.784
2022-10-17 20:12:05,934 - Epoch[22] Complete. Time taken: 00:00:07.649
2022-10-17 20:12:07,114 - Epoch: 23/40, Iter: 1/7 -- Loss: -2.9714
2022-10-17 20:12:07,300 - Epoch: 23/40, Iter: 2/7 -- Loss: -1.9730
2022-10-17 20:12:07,595 - Epoch: 23/40, Iter: 3/7 -- Loss: -1.8586
2022-10-17 20:12:07,761 - Epoch: 23/40, Iter: 4/7 -- Loss: -2.0419
2022-10-17 20:12:08,098 - Epoch: 23/40, Iter: 5/7 -- Loss: -2.4813
2022-10-17 20:12:08,319 - Epoch: 23/40, Iter: 6/7 -- Loss: -1.8450
2022-10-17 20:12:08,582 - Epoch: 23/40, Iter: 7/7 -- Loss: -2.6684
2022-10-17 20:12:08,853 - Engine run starting with max_epochs=1.
2022-10-17 20:12:18,410 - Epoch[23] Metrics -- asd: 4.9858 dice: 0.6673 hausdorff95: 17.
2173 jaccard: 0.5072
2022-10-17 20:12:18,809 - Epoch[1] Complete. Time taken: 00:00:09.530
2022-10-17 20:12:18,810 - Engine run complete. Time taken: 00:00:09.942
2022-10-17 20:12:19,009 - Epoch[23] Complete. Time taken: 00:00:13.071
2022-10-17 20:12:20,141 - Epoch: 24/40, Iter: 1/7 -- Loss: -3.0525
2022-10-17 20:12:20,331 - Epoch: 24/40, Iter: 2/7 -- Loss: -1.9740
2022-10-17 20:12:20,626 - Epoch: 24/40, Iter: 3/7 -- Loss: -1.8585
2022-10-17 20:12:20,766 - Epoch: 24/40, Iter: 4/7 -- Loss: -2.0527
2022-10-17 20:12:21,089 - Epoch: 24/40, Iter: 5/7 -- Loss: -2.4868
2022-10-17 20:12:21,187 - Epoch: 24/40, Iter: 6/7 -- Loss: -1.8523
2022-10-17 20:12:21,614 - Epoch: 24/40, Iter: 7/7 -- Loss: -2.7319
2022-10-17 20:12:21,830 - Engine run starting with max_epochs=1.
2022-10-17 20:12:30,136 - Epoch[24] Metrics -- asd: 5.0709 dice: 0.6651 hausdorff95: 17.
2218 jaccard: 0.5049
2022-10-17 20:12:30,471 - Epoch[1] Complete. Time taken: 00:00:08.375
2022-10-17 20:12:30,473 - Engine run complete. Time taken: 00:00:08.641
2022-10-17 20:12:30,634 - Epoch[24] Complete. Time taken: 00:00:11.621
2022-10-17 20:12:31,956 - Epoch: 25/40, Iter: 1/7 -- Loss: -3.1423
2022-10-17 20:12:32,016 - Epoch: 25/40, Iter: 2/7 -- Loss: -1.9778
2022-10-17 20:12:32,425 - Epoch: 25/40, Iter: 3/7 -- Loss: -1.8691
2022-10-17 20:12:32,515 - Epoch: 25/40, Iter: 4/7 -- Loss: -2.0760
2022-10-17 20:12:32,900 - Epoch: 25/40, Iter: 5/7 -- Loss: -2.5087
2022-10-17 20:12:32,976 - Epoch: 25/40, Iter: 6/7 -- Loss: -1.8634
2022-10-17 20:12:33,404 - Epoch: 25/40, Iter: 7/7 -- Loss: -2.7396
2022-10-17 20:12:33,635 - Engine run starting with max_epochs=1.
2022-10-17 20:12:42,007 - Epoch[25] Metrics -- asd: 5.0894 dice: 0.6713 hausdorff95: 17.
```

```
5165 jaccard: 0.5113
2022-10-17 20:12:42,337 - Epoch[1] Complete. Time taken: 00:00:08.450
2022-10-17 20:12:42,340 - Engine run complete. Time taken: 00:00:08.704
2022-10-17 20:12:42,539 - Epoch[25] Complete. Time taken: 00:00:11.901
2022-10-17 20:12:43,666 - Epoch: 26/40, Iter: 1/7 -- Loss: -3.1656
2022-10-17 20:12:43,770 - Epoch: 26/40, Iter: 2/7 -- Loss: -1.9829
2022-10-17 20:12:44,143 - Epoch: 26/40, Iter: 3/7 -- Loss: -1.8713
2022-10-17 20:12:44,220 - Epoch: 26/40, Iter: 4/7 -- Loss: -2.0776
2022-10-17 20:12:44,633 - Epoch: 26/40, Iter: 5/7 -- Loss: -2.5055
2022-10-17 20:12:44,700 - Epoch: 26/40, Iter: 6/7 -- Loss: -1.8616
2022-10-17 20:12:45,186 - Epoch: 26/40, Iter: 7/7 -- Loss: -2.7600
2022-10-17 20:12:45,514 - Engine run starting with max_epochs=1.
2022-10-17 20:12:54,162 - Epoch[26] Metrics -- asd: 5.2111 dice: 0.6589 hausdorff95: 17.
7230 jaccard: 0.4973
2022-10-17 20:12:54,511 - Epoch[1] Complete. Time taken: 00:00:08.724
2022-10-17 20:12:54,513 - Engine run complete. Time taken: 00:00:08.997
2022-10-17 20:12:54,641 - Epoch[26] Complete. Time taken: 00:00:12.098
2022-10-17 20:12:55,929 - Epoch: 27/40, Iter: 1/7 -- Loss: -3.2223
2022-10-17 20:12:56,016 - Epoch: 27/40, Iter: 2/7 -- Loss: -1.9849
2022-10-17 20:12:56,327 - Epoch: 27/40, Iter: 3/7 -- Loss: -1.8752
2022-10-17 20:12:56,450 - Epoch: 27/40, Iter: 4/7 -- Loss: -2.0911
2022-10-17 20:12:56,849 - Epoch: 27/40, Iter: 5/7 -- Loss: -2.5122
2022-10-17 20:12:57,070 - Epoch: 27/40, Iter: 6/7 -- Loss: -1.8714
2022-10-17 20:12:57,427 - Epoch: 27/40, Iter: 7/7 -- Loss: -2.7521
2022-10-17 20:12:57,694 - Engine run starting with max_epochs=1.
2022-10-17 20:13:06,142 - Epoch[27] Metrics -- asd: 4.8925 dice: 0.6779 hausdorff95: 17.
0879 jaccard: 0.5192
2022-10-17 20:13:06,562 - Epoch[1] Complete. Time taken: 00:00:08.594
2022-10-17 20:13:06,564 - Engine run complete. Time taken: 00:00:08.860
2022-10-17 20:13:06,750 - Epoch[27] Complete. Time taken: 00:00:12.105
2022-10-17 20:13:08,145 - Epoch: 28/40, Iter: 1/7 -- Loss: -3.2395
2022-10-17 20:13:08,232 - Epoch: 28/40, Iter: 2/7 -- Loss: -1.9868
2022-10-17 20:13:08,483 - Epoch: 28/40, Iter: 3/7 -- Loss: -1.8720
2022-10-17 20:13:08,580 - Epoch: 28/40, Iter: 4/7 -- Loss: -2.0859
2022-10-17 20:13:09,029 - Epoch: 28/40, Iter: 5/7 -- Loss: -2.5038
2022-10-17 20:13:09,095 - Epoch: 28/40, Iter: 6/7 -- Loss: -1.8561
2022-10-17 20:13:09,642 - Epoch: 28/40, Iter: 7/7 -- Loss: -2.7488
2022-10-17 20:13:09,878 - Engine run starting with max_epochs=1.
2022-10-17 20:13:18,858 - Epoch[28] Metrics -- asd: 5.5410 dice: 0.6284 hausdorff95: 18.
6809 jaccard: 0.4635
2022-10-17 20:13:19,186 - Epoch[1] Complete. Time taken: 00:00:08.966
2022-10-17 20:13:19,188 - Engine run complete. Time taken: 00:00:09.308
2022-10-17 20:13:19,343 - Epoch[28] Complete. Time taken: 00:00:12.588
2022-10-17 20:13:20,654 - Epoch: 29/40, Iter: 1/7 -- Loss: -3.2662
2022-10-17 20:13:20,759 - Epoch: 29/40, Iter: 2/7 -- Loss: -1.9871
2022-10-17 20:13:21,127 - Epoch: 29/40, Iter: 3/7 -- Loss: -1.8789
2022-10-17 20:13:21,268 - Epoch: 29/40, Iter: 4/7 -- Loss: -2.0940
2022-10-17 20:13:21,613 - Epoch: 29/40, Iter: 5/7 -- Loss: -2.5057
2022-10-17 20:13:21,842 - Epoch: 29/40, Iter: 6/7 -- Loss: -1.8773
2022-10-17 20:13:22,125 - Epoch: 29/40, Iter: 7/7 -- Loss: -2.7176
2022-10-17 20:13:22,348 - Engine run starting with max_epochs=1.
2022-10-17 20:13:31,909 - Epoch[29] Metrics -- asd: 5.0119 dice: 0.6734 hausdorff95: 17.
1102 jaccard: 0.5135
2022-10-17 20:13:32,228 - Epoch[1] Complete. Time taken: 00:00:09.585
2022-10-17 20:13:32,229 - Engine run complete. Time taken: 00:00:09.880
2022-10-17 20:13:32,368 - Epoch[29] Complete. Time taken: 00:00:13.021
2022-10-17 20:13:33,432 - Epoch: 30/40, Iter: 1/7 -- Loss: -3.2375
2022-10-17 20:13:33,787 - Epoch: 30/40, Iter: 2/7 -- Loss: -1.9915
2022-10-17 20:13:33,901 - Epoch: 30/40, Iter: 3/7 -- Loss: -1.8769
2022-10-17 20:13:34,291 - Epoch: 30/40, Iter: 4/7 -- Loss: -2.0881
2022-10-17 20:13:34,383 - Epoch: 30/40, Iter: 5/7 -- Loss: -2.5075
2022-10-17 20:13:34,769 - Epoch: 30/40, Iter: 6/7 -- Loss: -1.8476
2022-10-17 20:13:34,830 - Epoch: 30/40, Iter: 7/7 -- Loss: -2.7093
2022-10-17 20:13:35,026 - Engine run starting with max_epochs=1.
2022-10-17 20:13:43,727 - Epoch[30] Metrics -- asd: 5.7598 dice: 0.5916 hausdorff95: 19.
6798 jaccard: 0.4251
```

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2022-10-17 20:13:44,054 - Epoch[1] Complete. Time taken: 00:00:08.778
2022-10-17 20:13:44,056 - Engine run complete. Time taken: 00:00:09.028
2022-10-17 20:13:44,255 - Epoch[30] Complete. Time taken: 00:00:11.883
2022-10-17 20:13:45,547 - Epoch: 31/40, Iter: 1/7 -- Loss: -3.2520
2022-10-17 20:13:45,728 - Epoch: 31/40, Iter: 2/7 -- Loss: -1.9861
2022-10-17 20:13:45,958 - Epoch: 31/40, Iter: 3/7 -- Loss: -1.8779
2022-10-17 20:13:46,172 - Epoch: 31/40, Iter: 4/7 -- Loss: -2.1028
2022-10-17 20:13:46,445 - Epoch: 31/40, Iter: 5/7 -- Loss: -2.5095
2022-10-17 20:13:46,696 - Epoch: 31/40, Iter: 6/7 -- Loss: -1.8739
2022-10-17 20:13:46,950 - Epoch: 31/40, Iter: 7/7 -- Loss: -2.7282
2022-10-17 20:13:47,148 - Engine run starting with max_epochs=1.
2022-10-17 20:13:56,075 - Epoch[31] Metrics -- asd: 5.2319 dice: 0.6583 hausdorff95: 17.
3432 jaccard: 0.4969
2022-10-17 20:13:56,417 - Epoch[1] Complete. Time taken: 00:00:08.972
2022-10-17 20:13:56,419 - Engine run complete. Time taken: 00:00:09.269
2022-10-17 20:13:56,587 - Epoch[31] Complete. Time taken: 00:00:12.329
2022-10-17 20:13:57,684 - Epoch: 32/40, Iter: 1/7 -- Loss: -3.1682
2022-10-17 20:13:57,961 - Epoch: 32/40, Iter: 2/7 -- Loss: -1.9917
2022-10-17 20:13:58,154 - Epoch: 32/40, Iter: 3/7 -- Loss: -1.8836
2022-10-17 20:13:58,466 - Epoch: 32/40, Iter: 4/7 -- Loss: -2.1054
2022-10-17 20:13:58,607 - Epoch: 32/40, Iter: 5/7 -- Loss: -2.5197
2022-10-17 20:13:59,009 - Epoch: 32/40, Iter: 6/7 -- Loss: -1.8689
2022-10-17 20:13:59,087 - Epoch: 32/40, Iter: 7/7 -- Loss: -2.7506
2022-10-17 20:13:59,301 - Engine run starting with max_epochs=1.
2022-10-17 20:14:08,354 - Epoch[32] Metrics -- asd: 5.5465 dice: 0.6057 hausdorff95: 19.
1933 jaccard: 0.4401
2022-10-17 20:14:08,680 - Epoch[1] Complete. Time taken: 00:00:09.071
2022-10-17 20:14:08,681 - Engine run complete. Time taken: 00:00:09.378
2022-10-17 20:14:08,843 - Epoch[32] Complete. Time taken: 00:00:12.251
2022-10-17 20:14:10,216 - Epoch: 33/40, Iter: 1/7 -- Loss: -3.3189
2022-10-17 20:14:10,278 - Epoch: 33/40, Iter: 2/7 -- Loss: -1.9895
2022-10-17 20:14:10,686 - Epoch: 33/40, Iter: 3/7 -- Loss: -1.8758
2022-10-17 20:14:10,743 - Epoch: 33/40, Iter: 4/7 -- Loss: -2.0768
2022-10-17 20:14:11,156 - Epoch: 33/40, Iter: 5/7 -- Loss: -2.4746
2022-10-17 20:14:11,226 - Epoch: 33/40, Iter: 6/7 -- Loss: -1.8691
2022-10-17 20:14:11,605 - Epoch: 33/40, Iter: 7/7 -- Loss: -2.7884
2022-10-17 20:14:11,809 - Engine run starting with max_epochs=1.
2022-10-17 20:14:19,860 - Epoch[33] Metrics -- asd: 5.3948 dice: 0.6252 hausdorff95: 18.
1210 jaccard: 0.4607
2022-10-17 20:14:20,095 - Epoch[1] Complete. Time taken: 00:00:08.049
2022-10-17 20:14:20,096 - Engine run complete. Time taken: 00:00:08.285
2022-10-17 20:14:20,205 - Epoch[33] Complete. Time taken: 00:00:11.358
2022-10-17 20:14:21,143 - Epoch: 34/40, Iter: 1/7 -- Loss: -3.3624
2022-10-17 20:14:21,210 - Epoch: 34/40, Iter: 2/7 -- Loss: -1.9931
2022-10-17 20:14:21,507 - Epoch: 34/40, Iter: 3/7 -- Loss: -1.8801
2022-10-17 20:14:21,582 - Epoch: 34/40, Iter: 4/7 -- Loss: -2.1009
2022-10-17 20:14:21,870 - Epoch: 34/40, Iter: 5/7 -- Loss: -2.5144
2022-10-17 20:14:21,941 - Epoch: 34/40, Iter: 6/7 -- Loss: -1.8767
2022-10-17 20:14:22,215 - Epoch: 34/40, Iter: 7/7 -- Loss: -2.7883
2022-10-17 20:14:22,416 - Engine run starting with max_epochs=1.
2022-10-17 20:14:29,375 - Epoch[34] Metrics -- asd: 5.3210 dice: 0.6216 hausdorff95: 18.
4314 jaccard: 0.4575
2022-10-17 20:14:29,688 - Epoch[1] Complete. Time taken: 00:00:07.037
2022-10-17 20:14:29,689 - Engine run complete. Time taken: 00:00:07.272
2022-10-17 20:14:29,819 - Epoch[34] Complete. Time taken: 00:00:09.613
2022-10-17 20:14:30,562 - Epoch: 35/40, Iter: 1/7 -- Loss: -3.3184
2022-10-17 20:14:30,705 - Epoch: 35/40, Iter: 2/7 -- Loss: -1.9916
2022-10-17 20:14:30,893 - Epoch: 35/40, Iter: 3/7 -- Loss: -1.8821
2022-10-17 20:14:31,003 - Epoch: 35/40, Iter: 4/7 -- Loss: -2.1027
2022-10-17 20:14:31,190 - Epoch: 35/40, Iter: 5/7 -- Loss: -2.5169
2022-10-17 20:14:31,323 - Epoch: 35/40, Iter: 6/7 -- Loss: -1.8768
2022-10-17 20:14:31,469 - Epoch: 35/40, Iter: 7/7 -- Loss: -2.8070
2022-10-17 20:14:31,615 - Engine run starting with max_epochs=1.
2022-10-17 20:14:37,724 - Epoch[35] Metrics -- asd: 5.3706 dice: 0.6147 hausdorff95: 18.
9121 jaccard: 0.4496
2022-10-17 20:14:37,907 - Epoch[1] Complete. Time taken: 00:00:06.124
```

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2022-10-17 20:14:37,908 - Engine run complete. Time taken: 00:00:06.292
2022-10-17 20:14:38,039 - Epoch[35] Complete. Time taken: 00:00:08.219
2022-10-17 20:14:38,835 - Epoch: 36/40, Iter: 1/7 -- Loss: -3.3959
2022-10-17 20:14:38,898 - Epoch: 36/40, Iter: 2/7 -- Loss: -1.9945
2022-10-17 20:14:39,108 - Epoch: 36/40, Iter: 3/7 -- Loss: -1.8825
2022-10-17 20:14:39,165 - Epoch: 36/40, Iter: 4/7 -- Loss: -2.1090
2022-10-17 20:14:39,415 - Epoch: 36/40, Iter: 5/7 -- Loss: -2.5190
2022-10-17 20:14:39,470 - Epoch: 36/40, Iter: 6/7 -- Loss: -1.8809
2022-10-17 20:14:39,729 - Epoch: 36/40, Iter: 7/7 -- Loss: -2.8157
2022-10-17 20:14:39,877 - Engine run starting with max_epochs=1.
2022-10-17 20:14:45,417 - Epoch[36] Metrics -- asd: 5.1668 dice: 0.6417 hausdorff95: 18.
1475 jaccard: 0.4783
2022-10-17 20:14:45,685 - Epoch[1] Complete. Time taken: 00:00:05.632
2022-10-17 20:14:45,686 - Engine run complete. Time taken: 00:00:05.808
2022-10-17 20:14:45,825 - Epoch[36] Complete. Time taken: 00:00:07.785
2022-10-17 20:14:46,533 - Epoch: 37/40, Iter: 1/7 -- Loss: -3.4060
2022-10-17 20:14:46,594 - Epoch: 37/40, Iter: 2/7 -- Loss: -1.9961
2022-10-17 20:14:46,804 - Epoch: 37/40, Iter: 3/7 -- Loss: -1.8852
2022-10-17 20:14:46,879 - Epoch: 37/40, Iter: 4/7 -- Loss: -2.1144
2022-10-17 20:14:47,109 - Epoch: 37/40, Iter: 5/7 -- Loss: -2.5244
2022-10-17 20:14:47,159 - Epoch: 37/40, Iter: 6/7 -- Loss: -1.8809
2022-10-17 20:14:47,412 - Epoch: 37/40, Iter: 7/7 -- Loss: -2.8193
2022-10-17 20:14:47,565 - Engine run starting with max_epochs=1.
2022-10-17 20:14:52,958 - Epoch[37] Metrics -- asd: 5.1797 dice: 0.6405 hausdorff95: 18.
1716 jaccard: 0.4770
2022-10-17 20:14:53,154 - Epoch[1] Complete. Time taken: 00:00:05.407
2022-10-17 20:14:53,155 - Engine run complete. Time taken: 00:00:05.588
2022-10-17 20:14:53,265 - Epoch[37] Complete. Time taken: 00:00:07.438
2022-10-17 20:14:53,958 - Epoch: 38/40, Iter: 1/7 -- Loss: -3.4239
2022-10-17 20:14:54,013 - Epoch: 38/40, Iter: 2/7 -- Loss: -1.9971
2022-10-17 20:14:54,180 - Epoch: 38/40, Iter: 3/7 -- Loss: -1.8866
2022-10-17 20:14:54,239 - Epoch: 38/40, Iter: 4/7 -- Loss: -2.1181
2022-10-17 20:14:54,610 - Epoch: 38/40, Iter: 5/7 -- Loss: -2.5275
2022-10-17 20:14:54,702 - Epoch: 38/40, Iter: 6/7 -- Loss: -1.8837
2022-10-17 20:14:55,022 - Epoch: 38/40, Iter: 7/7 -- Loss: -2.8185
2022-10-17 20:14:55,235 - Engine run starting with max_epochs=1.
2022-10-17 20:15:03,392 - Epoch[38] Metrics -- asd: 5.1177 dice: 0.6537 hausdorff95: 17.
3625 jaccard: 0.4914
2022-10-17 20:15:03,695 - Epoch[1] Complete. Time taken: 00:00:08.214
2022-10-17 20:15:03,696 - Engine run complete. Time taken: 00:00:08.459
2022-10-17 20:15:03,826 - Epoch[38] Complete. Time taken: 00:00:10.560
2022-10-17 20:15:04,803 - Epoch: 39/40, Iter: 1/7 -- Loss: -3.4279
2022-10-17 20:15:04,874 - Epoch: 39/40, Iter: 2/7 -- Loss: -1.9983
2022-10-17 20:15:05,255 - Epoch: 39/40, Iter: 3/7 -- Loss: -1.8872
2022-10-17 20:15:05,316 - Epoch: 39/40, Iter: 4/7 -- Loss: -2.1195
2022-10-17 20:15:05,677 - Epoch: 39/40, Iter: 5/7 -- Loss: -2.5270
2022-10-17 20:15:05,765 - Epoch: 39/40, Iter: 6/7 -- Loss: -1.8831
2022-10-17 20:15:06,148 - Epoch: 39/40, Iter: 7/7 -- Loss: -2.8235
2022-10-17 20:15:06,338 - Engine run starting with max_epochs=1.
2022-10-17 20:15:14,276 - Epoch[39] Metrics -- asd: 5.1010 dice: 0.6410 hausdorff95: 18.
3535 jaccard: 0.4781
2022-10-17 20:15:14,551 - Epoch[1] Complete. Time taken: 00:00:08.048
2022-10-17 20:15:14,552 - Engine run complete. Time taken: 00:00:08.213
2022-10-17 20:15:14,683 - Epoch[39] Complete. Time taken: 00:00:10.856
2022-10-17 20:15:15,643 - Epoch: 40/40, Iter: 1/7 -- Loss: -3.4245
2022-10-17 20:15:15,741 - Epoch: 40/40, Iter: 2/7 -- Loss: -1.9976
2022-10-17 20:15:15,995 - Epoch: 40/40, Iter: 3/7 -- Loss: -1.8872
2022-10-17 20:15:16,195 - Epoch: 40/40, Iter: 4/7 -- Loss: -2.1198
2022-10-17 20:15:16,451 - Epoch: 40/40, Iter: 5/7 -- Loss: -2.5278
2022-10-17 20:15:16,682 - Epoch: 40/40, Iter: 6/7 -- Loss: -1.8843
2022-10-17 20:15:16,896 - Epoch: 40/40, Iter: 7/7 -- Loss: -2.8270
2022-10-17 20:15:17,063 - Engine run starting with max_epochs=1.
2022-10-17 20:15:25,488 - Epoch[40] Metrics -- asd: 5.1902 dice: 0.6439 hausdorff95: 17.
8868 jaccard: 0.4806
2022-10-17 20:15:25,790 - Epoch[1] Complete. Time taken: 00:00:08.538
2022-10-17 20:15:25,793 - Engine run complete. Time taken: 00:00:08.729
```
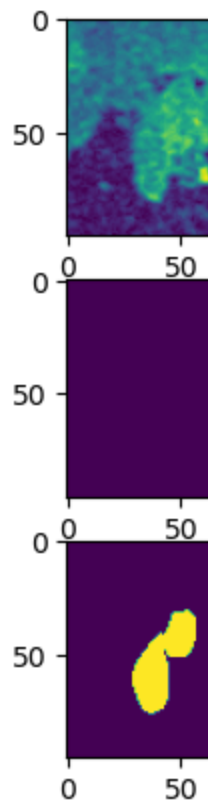
```
2022-10-17 20:15:25,929 - Epoch[40] Complete. Time taken: 00:00:11.245
2022-10-17 20:15:25,930 - Engine run complete. Time taken: 00:07:36.020
```

Output the eval performance.

```
In [35]:  evaluator.run(val_loader)
```

```
2022-10-17 20:15:26,073 - Engine run starting with max_epochs=1.
2022-10-17 20:15:32,779 - Epoch[40] Metrics -- asd: 5.1902 dice: 0.6439 hausdorff95: 17.
8868 jaccard: 0.4806
2022-10-17 20:15:32,968 - Epoch[1] Complete. Time taken: 00:00:06.651
2022-10-17 20:15:32,969 - Engine run complete. Time taken: 00:00:06.894
```

```
Out[35]:  State:
              iteration: 10
              epoch: 1
              epoch_length: 10
              max_epochs: 1
              output: <class 'tuple'>
              batch: <class 'list'>
              metrics: <class 'dict'>
              dataloader: <class 'monai.data.dataloader.DataLoader'>
              seed: <class 'NoneType'>
              times: <class 'dict'>
              metric_details: <class 'dict'>
```
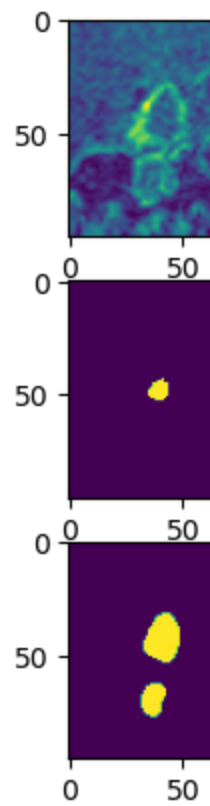
Prediction results.

```
In [36]:  net, opt = get_model_and_optimizer(checkpoint_path="./save/problem1/exp3/net_checkpoint_
```

```
In [52]:  sample_ids = [12, 13, 14, 15]
          for sample_id in sample_ids:
              predict(net, val_ds[sample_id][0], val_ds[sample_id][1], sample_id=sample_id)
```
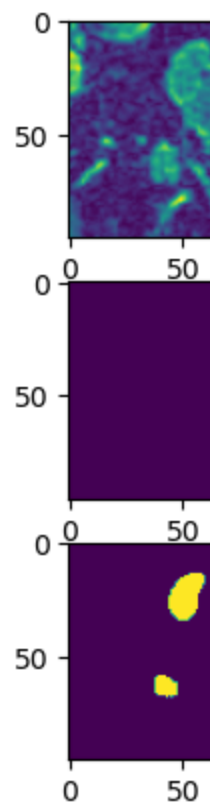
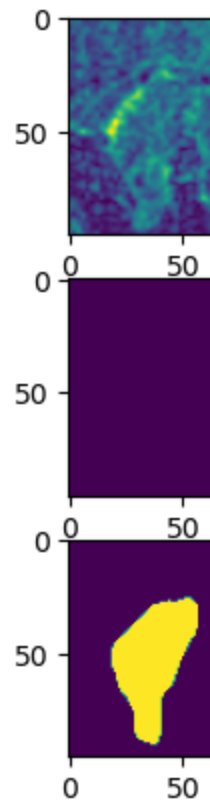Input image #12 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #13 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Input image #14 (top), predicted segmentation (middle), and ground truth segmentation (bottom)
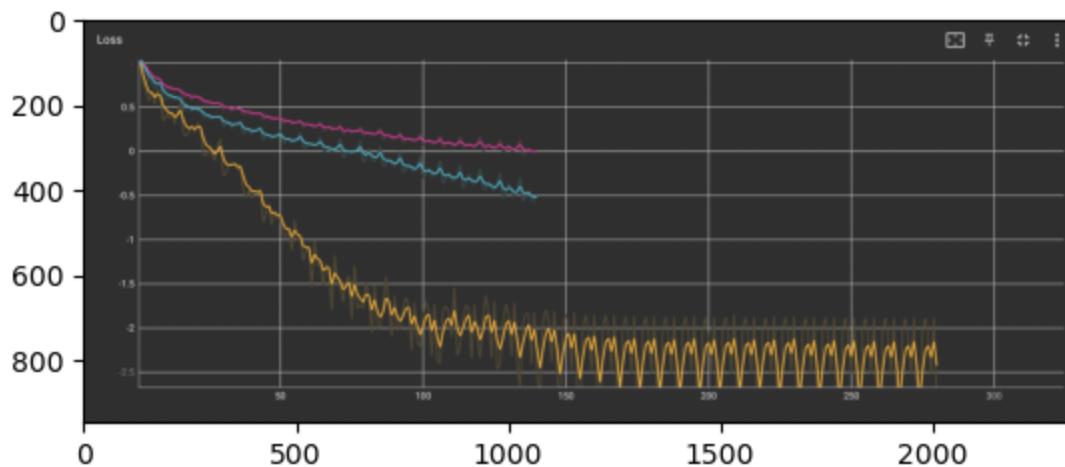
Input image #15 (top), predicted segmentation (middle), and ground truth segmentation (bottom)

Conclusion

```
In [54]:  plt.figure()
          img = mpimg.imread("./log/problem1/exp_train_loss.png")
          plt.imshow(img)
```

Out[54]: `<matplotlib.image.AxesImage at 0x7f4664256cb0>`

Exp. ID	Exp. Setting	Eval. ASD	Eval. Dice	Eval. Hausdorff (95%)	Eval. Jaccard
1	3D UNet (lr=1e-3)	3.15	85.92%	12.40	75.75%
2	3D UNet (lr=5e-4)	3.34	**86.03%**	12.16	76.02%
3	3D UNet (lr=5e-3)	5.19	64.39%	17.89	48.06%

In this notebook, I have:

1) tried out 3 different experiment configurations;

2) reported the results (i.e., train loss, eval loss, eval dice, eval ASD, eval hausdorff, and eval jaccard);

3) showed the train loss curve and predicted segmentation results (in the form of 2D slices); and

4) achieved a best performance of 86.03% using 3D UNet (through Experiment 2) for 3D segmentation on medical data.