DIC-C2DH-HeLa

July 20, 2025

1 U-Net cell segmentation on the DIC-C2DH-HeLa dataset

1.1 Import modules

[2]:
```
import matplotlib.pyplot as plt
import numpy as np
import cv2 as cv
import gc, os
```

[ ]:
```
import tensorflow as tf
import tensorflow.keras.backend as K
import tensorflow_datasets as tfds
```

```
2025-02-16 12:49:10.319557: I tensorflow/core/util/port.cc:153] oneDNN custom
operations are on. You may see slightly different numerical results due to
floating-point round-off errors from different computation orders. To turn them
off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
2025-02-16 12:49:10.332211: E
external/local_xla/xla/stream_executor/cuda/cuda_fft.cc:477] Unable to register
cuFFT factory: Attempting to register factory for plugin cuFFT when one has
already been registered
WARNING: All log messages before absl::InitializeLog() is called are written to
STDERR
E0000 00:00:1739720950.347795 1711261 cuda_dnn.cc:8310] Unable to register cuDNN
factory: Attempting to register factory for plugin cuDNN when one has already
been registered
E0000 00:00:1739720950.352193 1711261 cuda_blas.cc:1418] Unable to register
cuBLAS factory: Attempting to register factory for plugin cuBLAS when one has
already been registered
2025-02-16 12:49:10.368122: I tensorflow/core/platform/cpu_feature_guard.cc:210]
This TensorFlow binary is optimized to use available CPU instructions in
performance-critical operations.
To enable the following instructions: AVX2 AVX512F AVX512_VNNI FMA, in other
operations, rebuild TensorFlow with the appropriate compiler flags.
```

[4]:
```
from unet.utils import UNetHelper
from unet.losses import IoU, dice_loss, unet_sample_weights
from unet.augmentation import elastic_deformation, grid_deformation
```

```
I0000 00:00:1739720953.539797 1711261 gpu_device.cc:2022] Created device
/job:localhost/replica:0/task:0/device:GPU:0 with 21770 MB memory:  -> device:
0, name: NVIDIA GeForce RTX 3090, pci bus id: 0000:65:00.0, compute capability:
8.6
```

2 Notebook configuration

[ ]:
```
train_model = True
tf_dir = "TFData"
batch_size = 8
max_epochs = 280
```

[6]:
```
tf.get_logger().setLevel('ERROR')
```

2.1 Random seed

For resetting the seed when running the training loop multiple times

[7]:
```
reset_seed = lambda seed=42: tf.keras.utils.set_random_seed(seed)
reset_seed()
```

2.2 Distributed training strategy

This selection is based off the tools I have at my disposal: either 1 GPU at work or 2 on Kaggle

[ ]:
```
gpus = len(tf.config.list_physical_devices("GPU"))

if gpus <= 1:
    strategy = tf.distribute.OneDeviceStrategy(device="/GPU:0")
else:
    strategy = tf.distribute.MirroredStrategy(cross_device_ops=tf.distribute.
 ↪ReductionToOneDevice())

n_devices = strategy.num_replicas_in_sync
print(f"Using {n_devices} device(s).")
print(f"Using {strategy.__class__.__name__}.")
```

```
Using 1 devices.
Using OneDeviceStrategy.
```

3 Load the dataset

[ ]:
```
def process_img(img, mask):
    """
    Contrast Limited Adaptive Histogram Equalization (CLAHE) step,
    followed by sample weight calculation [0.0, 1.0] normalization.
    CLAHE uses the default OpenCV parameters.
```

```
    """
    clh = cv.createCLAHE(clipLimit=2.0, tileGridSize=(8, 8))
    clh_img = clh.apply(np.squeeze(img.numpy()))
    sample_weights = unet_sample_weights(mask.numpy(), data_type=np.float32)
    return (tf.constant(np.expand_dims(clh_img / 255.0, -1), dtype=tf.float32,␣
 ↪shape=img.get_shape()),
            mask,
            tf.constant(sample_weights, dtype=tf.float32, shape=mask.
 ↪get_shape()))
```

[ ]:
```
def min_max(arr):
    arr = np.asarray(arr)
    minimum, maximum = arr.min(), arr.max()
    return (arr - minimum) / (maximum - minimum)
```

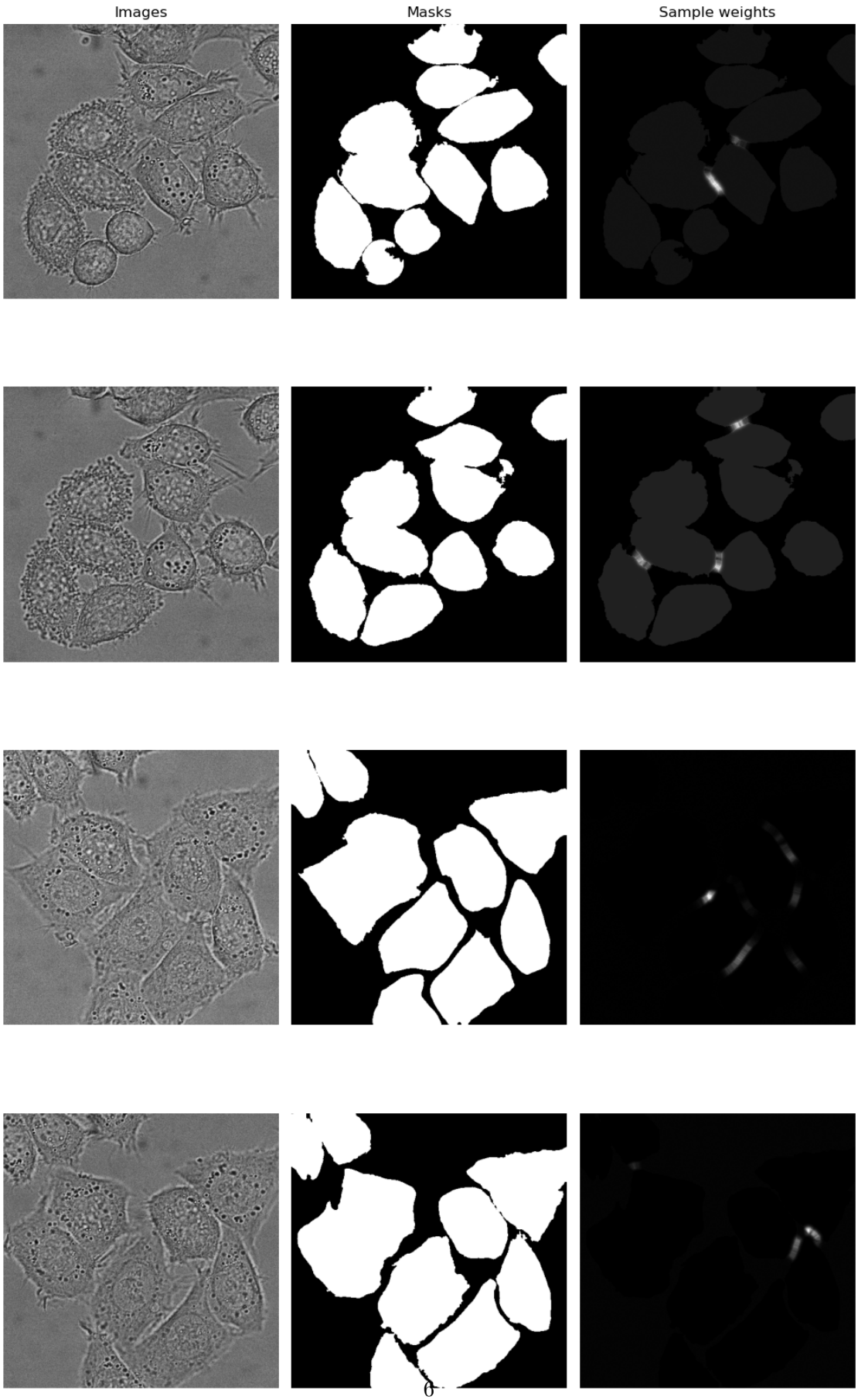
[ ]:
```
img_shape = (512, 512, 1)
mask_shape = (512, 512)

hela_train = tfds.load("hela_train", data_dir=tf_dir)

# Cache segment 01
hela_train["01"] = hela_train["01"].map(lambda sample: tf.
 ↪py_function(process_img, inp=[sample['image'], sample['mask']],
                                                                    Tout=[tf.
 ↪float32, tf.int32, tf.float32]),
                                        num_parallel_calls=tf.data.AUTOTUNE)\
                                    .map(lambda X, y, sw: (tf.ensure_shape(X,␣
 ↪img_shape),
                                                           tf.ensure_shape(y,␣
 ↪mask_shape),
                                                           tf.ensure_shape(sw,␣
 ↪mask_shape)))\
                                    .cache(f"{tf_dir}/TFCache/01_CLAHE_NORM")
example = list(hela_train["01"].take(2))
# Cache segment 02
hela_train["02"] = hela_train["02"].map(lambda pair: tf.
 ↪py_function(process_img, inp=[pair['image'], pair['mask']],
                                                                  Tout=[tf.
 ↪float32, tf.int32, tf.float32]),
                                        num_parallel_calls=tf.data.AUTOTUNE)\
                                    .map(lambda X, y, sw: (tf.ensure_shape(X,␣
 ↪img_shape),
                                                           tf.ensure_shape(y,␣
 ↪mask_shape),
                                                           tf.ensure_shape(sw,␣
 ↪mask_shape)))\
```

```
                                    .cache(f"{tf_dir}/TFCache/02_CLAHE_NORM")
example += list(hela_train["02"].take(2))
```

```
2025-02-16 12:49:15.089542: I
tensorflow/core/kernels/data/tf_record_dataset_op.cc:376] The default buffer
size is 262144, which is overridden by the user specified `buffer_size` of
8388608
2025-02-16 12:49:15.536624: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:332] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
2025-02-16 12:49:15.685278: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:914] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
2025-02-16 12:49:15.686194: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
2025-02-16 12:49:16.214053: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:332] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
2025-02-16 12:49:16.454575: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:914] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
2025-02-16 12:49:16.455637: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
```

[ ]:
```
fig, axes = plt.subplots(len(example), 3, figsize=(10, 5 * len(example)))

axes[0,0].set_title("Images")
axes[0,1].set_title("Masks")
axes[0,2].set_title("Sample weights")

for row, ex in zip(axes, example):
```

```
    for ax, img in zip(row, ex):
        ax.imshow(min_max(img), cmap="gray")
        ax.axis("off")

fig.tight_layout(h_pad=-15.0)
plt.show()
```


Images
Masks
Sample weights

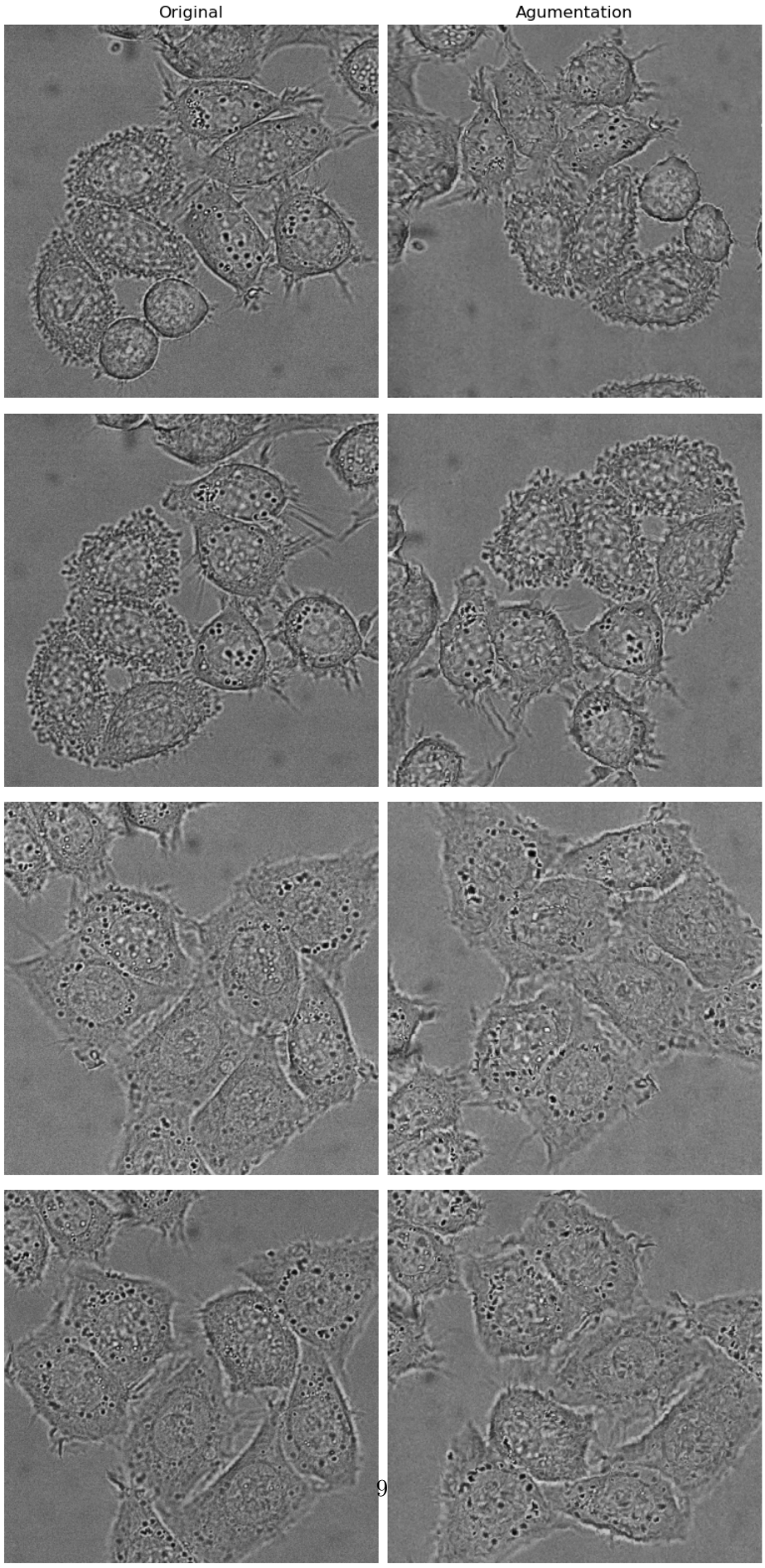
4 Data augmentation

[ ]:
```
@tf.function
def pipeline(X, y, w):
    # Add channel axis.
    y = tf.expand_dims(y, axis=-1)
    w = tf.expand_dims(w, axis=-1)
    # Horizontal flip.
    if tf.random.uniform((), 0.0, 1.0) >= 0.5:
        X = tf.image.flip_left_right(X)
        y = tf.image.flip_left_right(y)
        w = tf.image.flip_left_right(w)
    # Vertical flip.
    if tf.random.uniform((), 0.0, 1.0) >= 0.5:
        X = tf.image.flip_up_down(X)
        y = tf.image.flip_up_down(y)
        w = tf.image.flip_up_down(w)
    # Grid deformation.
    if tf.random.uniform((), 0.0, 1.0) >= 0.5:
        grid_size = 5
        distort_limits = (-0.35, 0.35)
        X = grid_deformation(X, distort_limits=distort_limits,␣
↪grid_size=grid_size, order=1)
        y = grid_deformation(y, distort_limits=distort_limits,␣
↪grid_size=grid_size, order=0)
        w = grid_deformation(w, distort_limits=distort_limits,␣
↪grid_size=grid_size, order=0)
    # Elastic deformation
    if tf.random.uniform((), 0.0, 1.0) >= 0.5:
        alpha = 100.0
        sigma = 5.0
        auto_kSize = True
        X = elastic_deformation(X, alpha=alpha, sigma=sigma,␣
↪auto_kSize=auto_kSize, order=1)
        y = elastic_deformation(y, alpha=alpha, sigma=sigma,␣
↪auto_kSize=auto_kSize, order=0)
        w = elastic_deformation(w, alpha=alpha, sigma=sigma,␣
↪auto_kSize=auto_kSize, order=0)
    return [X, tf.squeeze(y), tf.squeeze(w)]
```

[ ]:
```
fig, axes = plt.subplots(len(example), 2, figsize=(8, 4 * len(example)))

axes[0,0].set_title("Original")
```

```
axes[0,1].set_title("Augmented")

for row, (tmp_X, tmp_y, tmp_w) in zip(axes, example):
    row[0].imshow(min_max(ex[0]), cmap="gray")
    row[0].axis("off")
    row[1].imshow(min_max(pipeline(tf.expand_dims(tmp_X, 0),
                                   tf.expand_dims(tmp_y, 0),
                                   tf.expand_dims(tmp_w, 0))[0][0]),␣
 ↪cmap="gray")
    row[1].axis("off")

fig.tight_layout()
plt.show()
```

```
I0000 00:00:1739720961.053384 1711555 cuda_dnn.cc:529] Loaded cuDNN version
90300
```


Original
Agumentation

5 Main training loop

[ ]:
```
def train(helper, train_dataset, val_dataset=None, examples=None, epochs=100,␣
↪ckpt_every=10, plot_every=1, verbose=True): # A helper function I wrote in a␣
↪hurry.
    history = []
    ds_card = train_dataset.cardinality
    for epoch in range(1, epochs + 1):
        print(f'\nEpoch {epoch}/{epochs}')
        # Learning rate schedule
        if helper.opt_schedule is not None:
            helper.optimizer.learning_rate = helper.opt_schedule(epoch)
        # Create progress bar
        if verbose:
            progbar = tf.keras.utils.Progbar(target=ds_card)
        # Run the training steps
        for i, batch in enumerate(train_dataset):
            loss, acc = helper.dist_train_step(batch)
            # Update prog bar
            if verbose:
                progbar.update(i + 1, zip(['loss', 'acc'], [loss, acc]),␣
↪finalize=False)
        # Run for the validation set
        if val_dataset is not None:
            val_loss, val_acc = 0.0, 0.0
            for j, batch in enumerate(val_dataset):
                vloss, vacc = helper.dist_val_step(batch)
                val_loss += vloss
                val_acc += vacc
            val_loss /= (j + 1)
            val_acc /= (j + 1)
            history.append([loss, acc, val_loss, val_acc])
            if verbose:
                progbar.update(i, zip(['loss', 'acc', 'val_loss', 'val_acc',␣
↪'lr'],
                                      [loss, acc, val_loss, val_acc, helper.
↪optimizer.learning_rate.numpy()]), finalize=True)
        else:
            history.append([loss, acc])
            if verbose:
                progbar.update(i, zip(['loss', 'acc', 'lr'], [loss, acc, helper.
↪optimizer.learning_rate.numpy()]), finalize=True)
        # Save training checkpoint
```

```
        if type(ckpt_every) is int:
            if epoch % ckpt_every == 0:
                helper.checkpoint.save(helper.checkpoint_dir)
        # Plot training progression with the selected examples
        if type(plot_every) is int:
            if epoch % plot_every == 0 and examples is not None:
                plt.close()
                X, y = list(examples.take(1))[0]
                image_list = [X.numpy()[0], y.numpy()[0], helper.model(X).
↪numpy().argmax(axis=-1)[0]]
                image_list = [(255.0 * img).astype('uint8') if img.dtype !
↪='uint8' else img for img in image_list]
                fig, ax = plt.subplots(1, 3, figsize=(14, 28))
                ax[0].set_title("Image")
                ax[1].set_title("Mask")
                ax[2].set_title("Predicted Mask")
                for k in range(3):
                    ax[k].imshow(image_list[k], cmap="gray")
                    ax[k].axis("off")
                plt.show()
    return history
```

5.1 Cross-validation

Nothing too fancy: GroupKFold with each of the recordings as a group

[ ]:
```
max_lr = 1.E-3

lr_decay_start, lr_decay_rate, lr_decay_step = (2, 0.1, 3)

model_param = {"input_shape": img_shape,
               "dropout": 0.2}

oof_dice = []
oof_IoU = []

fold = [["01", "02"], ["02", "01"]]

for i in range(2):
    # In case we're running this cell over and over again when searching␣
↪hyperparameters
    try:
        del helper
    except:
        pass
    # Restore the random seed and clear the current TF graph
    reset_seed()
```

```
    K.clear_session()
    # Set the augmentation, batching and distribution of the dataset.
    # The augmentation .map() should come after both the .batch() and .cache()
    # for increased variety of augmented samples.
    training_size = hela_train[fold[i][0]].cardinality().numpy()
    train_ds = hela_train[fold[i][0]].shuffle(training_size,␣
↪reshuffle_each_iteration=True)\
                                     .repeat(np.lcm(batch_size, training_size) /
↪/ (training_size))\
                                     .batch(batch_size, drop_remainder=False,␣
↪num_parallel_calls=tf.data.AUTOTUNE)\
                                     .map(pipeline, num_parallel_calls=tf.data.
↪AUTOTUNE)\
                                     .prefetch(tf.data.AUTOTUNE)
    dist_train = strategy.experimental_distribute_dataset(train_ds)
    # Same thing for the validation split
    validation_size = hela_train[fold[i][1]].cardinality().numpy()
    val_ds = hela_train[fold[i][1]].map(lambda X, y, sw: (X, y))\
                                   .cache()\
                                   .batch(2 * batch_size, drop_remainder=False,␣
↪num_parallel_calls=tf.data.AUTOTUNE)
    dist_val = strategy.experimental_distribute_dataset(val_ds)
    # GPU training
    gc.collect()
    with strategy.scope():
        gc.collect()
        helper = UNetHelper(strategy=strategy,
                            model_param=model_param,
                            loss_func=tf.keras.losses.
↪sparse_categorical_crossentropy,
                            optimizer=tf.keras.optimizers.
↪SGD(learning_rate=max_lr, momentum=0.99),
                            #opt_schedule=tf.keras.optimizers.schedules.
↪PiecewiseConstantDecay(boundaries=[5,], values=[1e-2, 1e-3]),
                            )
        if train_model:
            train(helper, dist_train, dist_val, val_ds.rebatch(1), max_epochs,␣
↪ckpt_every=60, plot_every=70)#, max_epochs, ckpt_every=60, plot_every=70)
            helper.model.save(f"{tf_dir}/models/HeLa/model_fold{i + 1}.keras")
        else:
            helper.model.load(f"{tf_dir}/models/HeLa/model_fold{i + 1}.keras")
    # Out-of-fold results
    pred = helper.model.predict(val_ds.map(lambda X, y: X))
    oof_true = list(val_ds.map(lambda X, y: y).rebatch(validation_size).
↪take(1))[0]
    oof_dice.append(dice_loss(oof_true, pred).numpy().mean())
```

```
    oof_IoU.append(IoU(oof_true, pred).numpy().mean())
```

```
WARNING: All log messages before absl::InitializeLog() is called are written to
STDERR
W0000 00:00:1739720968.691303 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.
W0000 00:00:1739720968.783773 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.


Epoch 1/280

2025-02-16 12:49:35.155087: E tensorflow/core/util/util.cc:131] oneDNN supports
DT_INT32 only on platforms with AVX-512. Falling back to the default Eigen-based
implementation if present.
2025-02-16 12:49:38.801110: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:332] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
E0000 00:00:1739720986.221007 1711261 meta_optimizer.cc:966] layout failed:
INVALID_ARGUMENT: Size of values 0 does not match size of permutation 4 @ fanin
shape inStatefulPartitionedCall/sequential_1/u_net_1/spatial_dropout2d_1/statele
ss_dropout/SelectV2-2-TransposeNHWCToNCHW-LayoutOptimizer

20/21            0s 875ms/step -
loss: 1.0711 - acc: 0.4994

2025-02-16 12:50:24.958863: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]

21/21            68s 2s/step - loss:
1.0584 - acc: 0.5012 - val_loss: 0.7078 - val_acc: 0.4717 - lr: 0.0010

2025-02-16 12:50:39.166328: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
2025-02-16 12:50:39.170038: W
tensorflow/core/kernels/data/cache_dataset_ops.cc:332] The calling iterator did
not fully read the dataset being cached. In order to avoid unexpected truncation
of the dataset, the partially cached contents of the dataset  will be discarded.
This can happen if you have an input pipeline similar to
`dataset.cache().take(k).repeat()`. You should use
`dataset.take(k).cache().repeat()` instead.
```

```
Epoch 2/280
21/21             30s 1s/step - loss:
0.8980 - acc: 0.5496 - val_loss: 0.7024 - val_acc: 0.4741 - lr: 0.0010

Epoch 3/280
20/21             0s 908ms/step -
loss: 0.8013 - acc: 0.5948

2025-02-16 12:51:34.916872: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]

21/21             29s 1s/step - loss:
0.8000 - acc: 0.5963 - val_loss: 0.7054 - val_acc: 0.4733 - lr: 0.0010

Epoch 4/280
21/21             30s 1s/step - loss:
0.7052 - acc: 0.6282 - val_loss: 0.7019 - val_acc: 0.4719 - lr: 0.0010

Epoch 5/280
21/21             29s 1s/step - loss:
0.6645 - acc: 0.6455 - val_loss: 0.7012 - val_acc: 0.4712 - lr: 0.0010

2025-02-16 12:52:37.154559: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence


Epoch 6/280
21/21             30s 1s/step - loss:
0.6108 - acc: 0.6595 - val_loss: 0.7039 - val_acc: 0.4708 - lr: 0.0010

Epoch 7/280
21/21             30s 1s/step - loss:
0.5816 - acc: 0.6753 - val_loss: 0.7183 - val_acc: 0.4705 - lr: 0.0010

Epoch 8/280
21/21             31s 1s/step - loss:
0.5732 - acc: 0.6897 - val_loss: 0.7305 - val_acc: 0.4707 - lr: 0.0010

Epoch 9/280
21/21             29s 1s/step - loss:
0.5748 - acc: 0.7015 - val_loss: 0.7577 - val_acc: 0.4758 - lr: 0.0010

Epoch 10/280
21/21             29s 1s/step - loss:
0.5417 - acc: 0.7105 - val_loss: 0.8145 - val_acc: 0.4816 - lr: 0.0010

Epoch 11/280
20/21             0s 924ms/step -
```

```
loss: 0.5016 - acc: 0.7182

2025-02-16 12:55:33.380345: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]

21/21            30s 1s/step - loss:
0.4982 - acc: 0.7185 - val_loss: 0.9440 - val_acc: 0.4846 - lr: 0.0010

Epoch 12/280
21/21            30s 1s/step - loss:
0.5470 - acc: 0.7256 - val_loss: 1.0787 - val_acc: 0.4863 - lr: 0.0010

Epoch 13/280
21/21            30s 1s/step - loss:
0.5102 - acc: 0.7313 - val_loss: 0.8763 - val_acc: 0.4891 - lr: 0.0010

Epoch 14/280
21/21            30s 1s/step - loss:
0.5422 - acc: 0.7364 - val_loss: 0.8638 - val_acc: 0.4930 - lr: 0.0010

Epoch 15/280
21/21            30s 1s/step - loss:
0.4696 - acc: 0.7408 - val_loss: 0.8896 - val_acc: 0.4972 - lr: 0.0010

Epoch 16/280
21/21            30s 1s/step - loss:
0.4967 - acc: 0.7458 - val_loss: 0.8560 - val_acc: 0.5023 - lr: 0.0010

Epoch 17/280
21/21            30s 1s/step - loss:
0.5136 - acc: 0.7497 - val_loss: 0.7240 - val_acc: 0.5094 - lr: 0.0010

Epoch 18/280
21/21            30s 1s/step - loss:
0.4814 - acc: 0.7532 - val_loss: 0.7125 - val_acc: 0.5178 - lr: 0.0010

Epoch 19/280
21/21            30s 1s/step - loss:
0.4450 - acc: 0.7572 - val_loss: 0.7845 - val_acc: 0.5263 - lr: 0.0010

Epoch 20/280
21/21            30s 1s/step - loss:
0.4812 - acc: 0.7614 - val_loss: 0.6389 - val_acc: 0.5368 - lr: 0.0010

Epoch 21/280
21/21            30s 1s/step - loss:
0.5085 - acc: 0.7649 - val_loss: 0.5482 - val_acc: 0.5485 - lr: 0.0010
```

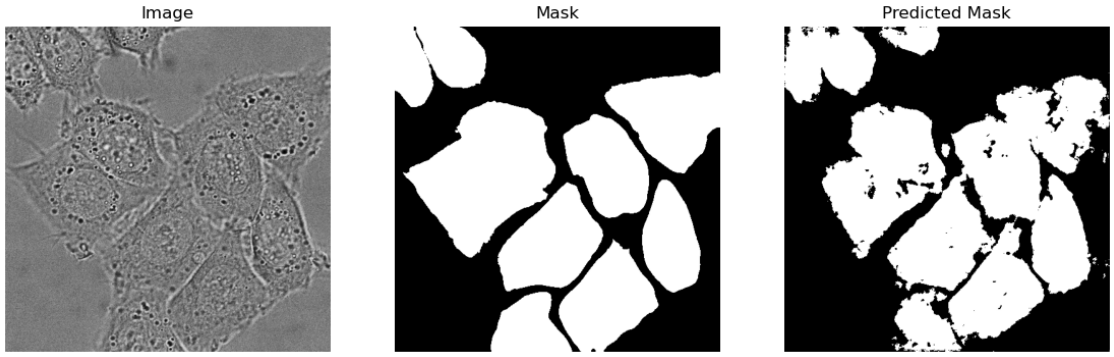
```
2025-02-16 13:00:37.300249: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence


Epoch 22/280
21/21            48s 2s/step - loss:
0.5018 - acc: 0.7675 - val_loss: 0.5762 - val_acc: 0.5589 - lr: 0.0010

Epoch 23/280
21/21            29s 1s/step - loss:
0.4909 - acc: 0.7703 - val_loss: 0.5880 - val_acc: 0.5677 - lr: 0.0010

Epoch 24/280
21/21            30s 1s/step - loss:
0.4262 - acc: 0.7734 - val_loss: 0.4729 - val_acc: 0.5769 - lr: 0.0010

Epoch 25/280
21/21            30s 1s/step - loss:
0.4853 - acc: 0.7768 - val_loss: 0.4890 - val_acc: 0.5859 - lr: 0.0010

Epoch 26/280
21/21            30s 1s/step - loss:
0.4547 - acc: 0.7795 - val_loss: 0.6578 - val_acc: 0.5914 - lr: 0.0010

Epoch 27/280
21/21            30s 1s/step - loss:
0.4790 - acc: 0.7821 - val_loss: 0.8094 - val_acc: 0.5935 - lr: 0.0010

Epoch 28/280
21/21            30s 1s/step - loss:
0.4369 - acc: 0.7845 - val_loss: 0.5941 - val_acc: 0.5979 - lr: 0.0010

Epoch 29/280
21/21            31s 1s/step - loss:
0.4994 - acc: 0.7872 - val_loss: 0.4635 - val_acc: 0.6049 - lr: 0.0010

Epoch 30/280
21/21            30s 1s/step - loss:
0.3934 - acc: 0.7894 - val_loss: 0.4628 - val_acc: 0.6120 - lr: 0.0010

Epoch 31/280
21/21            31s 1s/step - loss:
0.4622 - acc: 0.7920 - val_loss: 0.5079 - val_acc: 0.6178 - lr: 0.0010

Epoch 32/280
21/21            31s 1s/step - loss:
0.4760 - acc: 0.7938 - val_loss: 0.4603 - val_acc: 0.6233 - lr: 0.0010
```

```
Epoch 33/280
21/21             31s 1s/step - loss:
0.4575 - acc: 0.7956 - val_loss: 0.4056 - val_acc: 0.6293 - lr: 0.0010

Epoch 34/280
21/21             31s 1s/step - loss:
0.4296 - acc: 0.7976 - val_loss: 0.3993 - val_acc: 0.6354 - lr: 0.0010

Epoch 35/280
21/21             31s 1s/step - loss:
0.4280 - acc: 0.7997 - val_loss: 0.4614 - val_acc: 0.6403 - lr: 0.0010

Epoch 36/280
21/21             31s 1s/step - loss:
0.3945 - acc: 0.8017 - val_loss: 0.4313 - val_acc: 0.6447 - lr: 0.0010

Epoch 37/280
21/21             31s 1s/step - loss:
0.3598 - acc: 0.8039 - val_loss: 0.4683 - val_acc: 0.6487 - lr: 0.0010

Epoch 38/280
21/21             31s 1s/step - loss:
0.3897 - acc: 0.8062 - val_loss: 0.5599 - val_acc: 0.6517 - lr: 0.0010

Epoch 39/280
21/21             31s 1s/step - loss:
0.3320 - acc: 0.8082 - val_loss: 0.4000 - val_acc: 0.6557 - lr: 0.0010

Epoch 40/280
21/21             31s 1s/step - loss:
0.4110 - acc: 0.8104 - val_loss: 0.3107 - val_acc: 0.6610 - lr: 0.0010

Epoch 41/280
21/21             31s 1s/step - loss:
0.4836 - acc: 0.8122 - val_loss: 0.4244 - val_acc: 0.6655 - lr: 0.0010

Epoch 42/280
21/21             48s 2s/step - loss:
0.4287 - acc: 0.8134 - val_loss: 0.4060 - val_acc: 0.6693 - lr: 0.0010

Epoch 43/280
20/21             0s 956ms/step -
loss: 0.3354 - acc: 0.8149

2025-02-16 13:12:26.000982: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]
```

```
21/21            31s 1s/step - loss:
0.3732 - acc: 0.8149 - val_loss: 0.2866 - val_acc: 0.6739 - lr: 0.0010

Epoch 44/280
21/21            31s 1s/step - loss:
0.3069 - acc: 0.8168 - val_loss: 0.3092 - val_acc: 0.6787 - lr: 0.0010

Epoch 45/280
21/21            31s 1s/step - loss:
0.4623 - acc: 0.8187 - val_loss: 0.4092 - val_acc: 0.6826 - lr: 0.0010

Epoch 46/280
21/21            32s 1s/step - loss:
0.4069 - acc: 0.8199 - val_loss: 0.2931 - val_acc: 0.6867 - lr: 0.0010

Epoch 47/280
21/21            30s 1s/step - loss:
0.3709 - acc: 0.8211 - val_loss: 0.2685 - val_acc: 0.6911 - lr: 0.0010

Epoch 48/280
21/21            31s 1s/step - loss:
0.4193 - acc: 0.8224 - val_loss: 0.3266 - val_acc: 0.6949 - lr: 0.0010

Epoch 49/280
21/21            31s 1s/step - loss:
0.3724 - acc: 0.8235 - val_loss: 0.4260 - val_acc: 0.6975 - lr: 0.0010

Epoch 50/280
21/21            31s 1s/step - loss:
0.3472 - acc: 0.8249 - val_loss: 0.3941 - val_acc: 0.7000 - lr: 0.0010

Epoch 51/280
21/21            30s 1s/step - loss:
0.4648 - acc: 0.8263 - val_loss: 0.3481 - val_acc: 0.7028 - lr: 0.0010

Epoch 52/280
21/21            30s 1s/step - loss:
0.3304 - acc: 0.8273 - val_loss: 0.3239 - val_acc: 0.7059 - lr: 0.0010

Epoch 53/280
21/21            31s 1s/step - loss:
0.2682 - acc: 0.8288 - val_loss: 0.2720 - val_acc: 0.7093 - lr: 0.0010

Epoch 54/280
21/21            29s 1s/step - loss:
0.3648 - acc: 0.8305 - val_loss: 0.2877 - val_acc: 0.7126 - lr: 0.0010

Epoch 55/280
```

```
21/21            29s 987ms/step -
loss: 0.3029 - acc: 0.8318 - val_loss: 0.3444 - val_acc: 0.7156 - lr: 0.0010

Epoch 56/280
21/21            29s 1s/step - loss:
0.3937 - acc: 0.8333 - val_loss: 0.3009 - val_acc: 0.7185 - lr: 0.0010

Epoch 57/280
21/21            29s 1s/step - loss:
0.3564 - acc: 0.8343 - val_loss: 0.2880 - val_acc: 0.7215 - lr: 0.0010

Epoch 58/280
21/21            28s 1s/step - loss:
0.4482 - acc: 0.8353 - val_loss: 0.2841 - val_acc: 0.7244 - lr: 0.0010

Epoch 59/280
21/21            29s 1s/step - loss:
0.2610 - acc: 0.8362 - val_loss: 0.2820 - val_acc: 0.7272 - lr: 0.0010

Epoch 60/280
21/21            29s 1s/step - loss:
0.3134 - acc: 0.8377 - val_loss: 0.3012 - val_acc: 0.7298 - lr: 0.0010

Epoch 61/280
21/21            29s 1s/step - loss:
0.2448 - acc: 0.8389 - val_loss: 0.2954 - val_acc: 0.7322 - lr: 0.0010

Epoch 62/280
21/21            29s 1s/step - loss:
0.4185 - acc: 0.8403 - val_loss: 0.2422 - val_acc: 0.7349 - lr: 0.0010

Epoch 63/280
21/21            29s 1s/step - loss:
0.4207 - acc: 0.8410 - val_loss: 0.2278 - val_acc: 0.7377 - lr: 0.0010

Epoch 64/280
21/21            28s 1s/step - loss:
0.3756 - acc: 0.8417 - val_loss: 0.2175 - val_acc: 0.7404 - lr: 0.0010

Epoch 65/280
21/21            29s 1s/step - loss:
0.2771 - acc: 0.8426 - val_loss: 0.2140 - val_acc: 0.7432 - lr: 0.0010

Epoch 66/280
21/21            29s 1s/step - loss:
0.3975 - acc: 0.8438 - val_loss: 0.2296 - val_acc: 0.7458 - lr: 0.0010

Epoch 67/280
```

```
21/21            29s 1s/step - loss:
0.3749 - acc: 0.8446 - val_loss: 0.4037 - val_acc: 0.7474 - lr: 0.0010

Epoch 68/280
21/21            29s 1s/step - loss:
0.3770 - acc: 0.8453 - val_loss: 0.4280 - val_acc: 0.7485 - lr: 0.0010

Epoch 69/280
21/21            29s 1s/step - loss:
0.3849 - acc: 0.8458 - val_loss: 0.3147 - val_acc: 0.7500 - lr: 0.0010

Epoch 70/280
21/21            29s 1s/step - loss:
0.2684 - acc: 0.8465 - val_loss: 0.3036 - val_acc: 0.7518 - lr: 0.0010
```




```
Epoch 71/280
21/21            29s 1s/step - loss:
0.3202 - acc: 0.8475 - val_loss: 0.3269 - val_acc: 0.7534 - lr: 0.0010

Epoch 72/280
21/21            29s 1s/step - loss:
0.3483 - acc: 0.8484 - val_loss: 0.2664 - val_acc: 0.7552 - lr: 0.0010

Epoch 73/280
21/21            29s 1s/step - loss:
0.4153 - acc: 0.8492 - val_loss: 0.2615 - val_acc: 0.7571 - lr: 0.0010

Epoch 74/280
21/21            29s 1s/step - loss:
0.2713 - acc: 0.8498 - val_loss: 0.3210 - val_acc: 0.7587 - lr: 0.0010

Epoch 75/280
21/21            29s 1s/step - loss:
0.2327 - acc: 0.8508 - val_loss: 0.2502 - val_acc: 0.7605 - lr: 0.0010
```

```
Epoch 76/280
21/21            29s 1s/step - loss:
0.3517 - acc: 0.8517 - val_loss: 0.2346 - val_acc: 0.7623 - lr: 0.0010

Epoch 77/280
21/21            29s 1s/step - loss:
0.3334 - acc: 0.8524 - val_loss: 0.2855 - val_acc: 0.7640 - lr: 0.0010

Epoch 78/280
21/21            29s 1s/step - loss:
0.3184 - acc: 0.8531 - val_loss: 0.2318 - val_acc: 0.7657 - lr: 0.0010

Epoch 79/280
21/21            29s 1s/step - loss:
0.3126 - acc: 0.8537 - val_loss: 0.2104 - val_acc: 0.7676 - lr: 0.0010

Epoch 80/280
21/21            29s 1s/step - loss:
0.3977 - acc: 0.8543 - val_loss: 0.2342 - val_acc: 0.7695 - lr: 0.0010

Epoch 81/280
21/21            29s 1s/step - loss:
0.2755 - acc: 0.8549 - val_loss: 0.2521 - val_acc: 0.7711 - lr: 0.0010

Epoch 82/280
21/21            29s 1s/step - loss:
0.4414 - acc: 0.8555 - val_loss: 0.2335 - val_acc: 0.7728 - lr: 0.0010

Epoch 83/280
21/21            29s 1s/step - loss:
0.2814 - acc: 0.8559 - val_loss: 0.2698 - val_acc: 0.7743 - lr: 0.0010

Epoch 84/280
21/21            29s 1s/step - loss:
0.2332 - acc: 0.8567 - val_loss: 0.2447 - val_acc: 0.7758 - lr: 0.0010

Epoch 85/280
21/21            29s 1s/step - loss:
0.3972 - acc: 0.8575 - val_loss: 0.2439 - val_acc: 0.7773 - lr: 0.0010

2025-02-16 13:33:04.530062: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]


Epoch 86/280
21/21            29s 1s/step - loss:
```

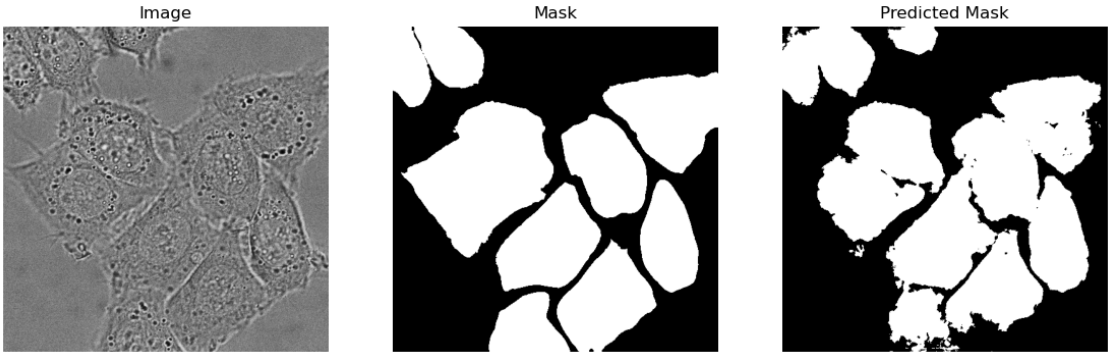
```
0.2227 - acc: 0.8580 - val_loss: 0.2465 - val_acc: 0.7788 - lr: 0.0010

Epoch 87/280
21/21            29s 1s/step - loss:
0.2785 - acc: 0.8588 - val_loss: 0.2141 - val_acc: 0.7803 - lr: 0.0010

Epoch 88/280
21/21            29s 1s/step - loss:
0.2091 - acc: 0.8596 - val_loss: 0.2209 - val_acc: 0.7819 - lr: 0.0010

Epoch 89/280
21/21            29s 1s/step - loss:
0.2756 - acc: 0.8604 - val_loss: 0.2139 - val_acc: 0.7834 - lr: 0.0010

Epoch 90/280
21/21            29s 1s/step - loss:
0.3105 - acc: 0.8611 - val_loss: 0.2220 - val_acc: 0.7848 - lr: 0.0010

Epoch 91/280
21/21            29s 1s/step - loss:
0.3635 - acc: 0.8617 - val_loss: 0.2578 - val_acc: 0.7861 - lr: 0.0010

Epoch 92/280
21/21            29s 1s/step - loss:
0.2246 - acc: 0.8622 - val_loss: 0.2613 - val_acc: 0.7874 - lr: 0.0010

Epoch 93/280
21/21            28s 1s/step - loss:
0.3317 - acc: 0.8630 - val_loss: 0.2465 - val_acc: 0.7886 - lr: 0.0010

Epoch 94/280
21/21            29s 1s/step - loss:
0.2548 - acc: 0.8636 - val_loss: 0.3032 - val_acc: 0.7897 - lr: 0.0010

Epoch 95/280
21/21            29s 1s/step - loss:
0.4008 - acc: 0.8642 - val_loss: 0.2866 - val_acc: 0.7906 - lr: 0.0010

Epoch 96/280
21/21            29s 1s/step - loss:
0.2855 - acc: 0.8645 - val_loss: 0.2603 - val_acc: 0.7917 - lr: 0.0010

Epoch 97/280
21/21            29s 1s/step - loss:
0.3149 - acc: 0.8651 - val_loss: 0.2363 - val_acc: 0.7929 - lr: 0.0010

Epoch 98/280
21/21            29s 1s/step - loss:
```

```
0.2925 - acc: 0.8655 - val_loss: 0.2475 - val_acc: 0.7940 - lr: 0.0010

Epoch 99/280
21/21            29s 1s/step - loss:
0.2517 - acc: 0.8661 - val_loss: 0.2463 - val_acc: 0.7951 - lr: 0.0010

Epoch 100/280
21/21            29s 1s/step - loss:
0.2029 - acc: 0.8667 - val_loss: 0.1899 - val_acc: 0.7963 - lr: 0.0010

Epoch 101/280
21/21            29s 1s/step - loss:
0.2859 - acc: 0.8675 - val_loss: 0.1924 - val_acc: 0.7976 - lr: 0.0010

Epoch 102/280
21/21            29s 1s/step - loss:
0.3790 - acc: 0.8679 - val_loss: 0.2384 - val_acc: 0.7987 - lr: 0.0010

Epoch 103/280
21/21            29s 1s/step - loss:
0.3662 - acc: 0.8682 - val_loss: 0.2581 - val_acc: 0.7997 - lr: 0.0010

Epoch 104/280
21/21            29s 1s/step - loss:
0.3237 - acc: 0.8685 - val_loss: 0.2097 - val_acc: 0.8007 - lr: 0.0010

Epoch 105/280
21/21            29s 1s/step - loss:
0.3344 - acc: 0.8689 - val_loss: 0.2023 - val_acc: 0.8019 - lr: 0.0010

Epoch 106/280
21/21            29s 1s/step - loss:
0.2243 - acc: 0.8693 - val_loss: 0.2349 - val_acc: 0.8030 - lr: 0.0010

Epoch 107/280
21/21            29s 1s/step - loss:
0.2182 - acc: 0.8700 - val_loss: 0.2100 - val_acc: 0.8042 - lr: 0.0010

Epoch 108/280
21/21            29s 1s/step - loss:
0.2661 - acc: 0.8707 - val_loss: 0.1913 - val_acc: 0.8053 - lr: 0.0010

Epoch 109/280
21/21            30s 1s/step - loss:
0.3979 - acc: 0.8711 - val_loss: 0.2049 - val_acc: 0.8064 - lr: 0.0010

Epoch 110/280
21/21            29s 1s/step - loss:
```

```
0.4222 - acc: 0.8714 - val_loss: 0.2469 - val_acc: 0.8073 - lr: 0.0010

Epoch 111/280
21/21            29s 1s/step - loss:
0.2072 - acc: 0.8717 - val_loss: 0.2553 - val_acc: 0.8082 - lr: 0.0010

Epoch 112/280
21/21            29s 1s/step - loss:
0.2079 - acc: 0.8723 - val_loss: 0.2204 - val_acc: 0.8090 - lr: 0.0010

Epoch 113/280
21/21            29s 1s/step - loss:
0.3006 - acc: 0.8728 - val_loss: 0.2249 - val_acc: 0.8099 - lr: 0.0010

Epoch 114/280
21/21            29s 1s/step - loss:
0.3128 - acc: 0.8732 - val_loss: 0.2376 - val_acc: 0.8108 - lr: 0.0010

Epoch 115/280
21/21            29s 1s/step - loss:
0.2963 - acc: 0.8736 - val_loss: 0.2140 - val_acc: 0.8117 - lr: 0.0010

Epoch 116/280
21/21            29s 1s/step - loss:
0.2285 - acc: 0.8741 - val_loss: 0.1949 - val_acc: 0.8127 - lr: 0.0010

Epoch 117/280
21/21            29s 1s/step - loss:
0.2019 - acc: 0.8746 - val_loss: 0.2072 - val_acc: 0.8136 - lr: 0.0010

Epoch 118/280
21/21            29s 1s/step - loss:
0.2945 - acc: 0.8751 - val_loss: 0.2528 - val_acc: 0.8144 - lr: 0.0010

Epoch 119/280
21/21            29s 1s/step - loss:
0.2929 - acc: 0.8755 - val_loss: 0.2433 - val_acc: 0.8151 - lr: 0.0010

Epoch 120/280
21/21            29s 1s/step - loss:
0.2564 - acc: 0.8759 - val_loss: 0.1847 - val_acc: 0.8160 - lr: 0.0010

Epoch 121/280
21/21            29s 1s/step - loss:
0.4567 - acc: 0.8762 - val_loss: 0.1807 - val_acc: 0.8169 - lr: 0.0010

Epoch 122/280
21/21            29s 1s/step - loss:
```

```
0.3006 - acc: 0.8764 - val_loss: 0.2169 - val_acc: 0.8178 - lr: 0.0010

Epoch 123/280
21/21            29s 1s/step - loss:
0.3046 - acc: 0.8767 - val_loss: 0.2134 - val_acc: 0.8186 - lr: 0.0010

Epoch 124/280
21/21            29s 1s/step - loss:
0.2110 - acc: 0.8771 - val_loss: 0.2137 - val_acc: 0.8195 - lr: 0.0010

Epoch 125/280
21/21            28s 1s/step - loss:
0.3844 - acc: 0.8776 - val_loss: 0.2308 - val_acc: 0.8203 - lr: 0.0010

Epoch 126/280
21/21            29s 1s/step - loss:
0.2946 - acc: 0.8777 - val_loss: 0.2219 - val_acc: 0.8210 - lr: 0.0010

Epoch 127/280
21/21            29s 1s/step - loss:
0.1934 - acc: 0.8781 - val_loss: 0.1939 - val_acc: 0.8218 - lr: 0.0010

Epoch 128/280
21/21            29s 1s/step - loss:
0.2793 - acc: 0.8786 - val_loss: 0.2155 - val_acc: 0.8226 - lr: 0.0010

Epoch 129/280
21/21            29s 1s/step - loss:
0.3098 - acc: 0.8789 - val_loss: 0.3596 - val_acc: 0.8230 - lr: 0.0010

Epoch 130/280
21/21            29s 1s/step - loss:
0.2928 - acc: 0.8792 - val_loss: 0.2901 - val_acc: 0.8233 - lr: 0.0010

Epoch 131/280
21/21            29s 1s/step - loss:
0.1977 - acc: 0.8795 - val_loss: 0.2066 - val_acc: 0.8239 - lr: 0.0010

Epoch 132/280
21/21            29s 1s/step - loss:
0.3312 - acc: 0.8799 - val_loss: 0.2064 - val_acc: 0.8247 - lr: 0.0010

Epoch 133/280
21/21            29s 1s/step - loss:
0.2731 - acc: 0.8802 - val_loss: 0.2453 - val_acc: 0.8253 - lr: 0.0010

Epoch 134/280
21/21            29s 1s/step - loss:
```

```
0.3715 - acc: 0.8804 - val_loss: 0.2595 - val_acc: 0.8258 - lr: 0.0010

Epoch 135/280
21/21            29s 1s/step - loss:
0.3484 - acc: 0.8806 - val_loss: 0.2738 - val_acc: 0.8263 - lr: 0.0010

Epoch 136/280
21/21            30s 1s/step - loss:
0.2855 - acc: 0.8808 - val_loss: 0.3091 - val_acc: 0.8267 - lr: 0.0010

Epoch 137/280
21/21            29s 1s/step - loss:
0.2057 - acc: 0.8811 - val_loss: 0.2666 - val_acc: 0.8272 - lr: 0.0010

Epoch 138/280
21/21            29s 1s/step - loss:
0.3038 - acc: 0.8815 - val_loss: 0.2112 - val_acc: 0.8278 - lr: 0.0010

Epoch 139/280
21/21            28s 1s/step - loss:
0.3832 - acc: 0.8818 - val_loss: 0.2124 - val_acc: 0.8284 - lr: 0.0010

Epoch 140/280
21/21            30s 1s/step - loss:
0.2660 - acc: 0.8819 - val_loss: 0.2386 - val_acc: 0.8290 - lr: 0.0010
```




```
Epoch 141/280
21/21            48s 2s/step - loss:
0.2011 - acc: 0.8823 - val_loss: 0.1952 - val_acc: 0.8296 - lr: 0.0010

Epoch 142/280
21/21            29s 1s/step - loss:
0.3687 - acc: 0.8827 - val_loss: 0.1942 - val_acc: 0.8303 - lr: 0.0010
```

```
Epoch 143/280
21/21            29s 1s/step - loss:
0.4359 - acc: 0.8828 - val_loss: 0.2575 - val_acc: 0.8309 - lr: 0.0010

Epoch 144/280
21/21            29s 1s/step - loss:
0.3470 - acc: 0.8828 - val_loss: 0.3040 - val_acc: 0.8313 - lr: 0.0010

Epoch 145/280
21/21            29s 1s/step - loss:
0.3953 - acc: 0.8828 - val_loss: 0.2693 - val_acc: 0.8317 - lr: 0.0010

Epoch 146/280
21/21            29s 1s/step - loss:
0.3037 - acc: 0.8829 - val_loss: 0.2312 - val_acc: 0.8322 - lr: 0.0010

Epoch 147/280
21/21            29s 1s/step - loss:
0.3332 - acc: 0.8832 - val_loss: 0.2225 - val_acc: 0.8328 - lr: 0.0010

Epoch 148/280
21/21            30s 1s/step - loss:
0.3254 - acc: 0.8833 - val_loss: 0.2143 - val_acc: 0.8334 - lr: 0.0010

Epoch 149/280
21/21            30s 1s/step - loss:
0.1967 - acc: 0.8836 - val_loss: 0.2028 - val_acc: 0.8340 - lr: 0.0010

Epoch 150/280
21/21            30s 1s/step - loss:
0.4088 - acc: 0.8839 - val_loss: 0.2516 - val_acc: 0.8345 - lr: 0.0010

Epoch 151/280
21/21            30s 1s/step - loss:
0.2473 - acc: 0.8840 - val_loss: 0.3442 - val_acc: 0.8348 - lr: 0.0010

Epoch 152/280
21/21            29s 1s/step - loss:
0.3174 - acc: 0.8843 - val_loss: 0.2264 - val_acc: 0.8352 - lr: 0.0010

Epoch 153/280
21/21            29s 1s/step - loss:
0.3343 - acc: 0.8845 - val_loss: 0.2308 - val_acc: 0.8357 - lr: 0.0010

Epoch 154/280
21/21            29s 1s/step - loss:
0.2642 - acc: 0.8846 - val_loss: 0.2574 - val_acc: 0.8361 - lr: 0.0010
```

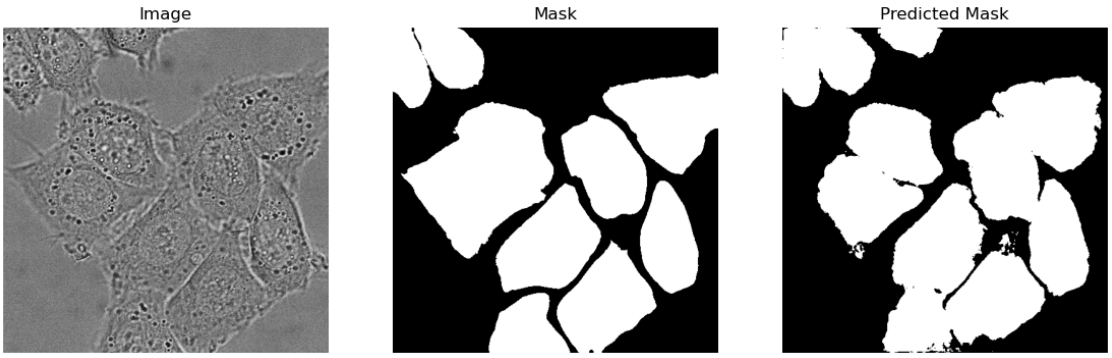
```
Epoch 155/280
21/21            29s 1s/step - loss:
0.2754 - acc: 0.8849 - val_loss: 0.2307 - val_acc: 0.8366 - lr: 0.0010

Epoch 156/280
21/21            29s 1s/step - loss:
0.3764 - acc: 0.8851 - val_loss: 0.2129 - val_acc: 0.8371 - lr: 0.0010

Epoch 157/280
21/21            29s 1s/step - loss:
0.3025 - acc: 0.8852 - val_loss: 0.2147 - val_acc: 0.8377 - lr: 0.0010

Epoch 158/280
21/21            29s 1s/step - loss:
0.3806 - acc: 0.8853 - val_loss: 0.2238 - val_acc: 0.8382 - lr: 0.0010

Epoch 159/280
21/21            29s 1s/step - loss:
0.3734 - acc: 0.8854 - val_loss: 0.2410 - val_acc: 0.8387 - lr: 0.0010

Epoch 160/280
21/21            29s 1s/step - loss:
0.2303 - acc: 0.8855 - val_loss: 0.2454 - val_acc: 0.8392 - lr: 0.0010

Epoch 161/280
21/21            29s 1s/step - loss:
0.2741 - acc: 0.8858 - val_loss: 0.2345 - val_acc: 0.8396 - lr: 0.0010

Epoch 162/280
21/21            30s 1s/step - loss:
0.3498 - acc: 0.8860 - val_loss: 0.2744 - val_acc: 0.8400 - lr: 0.0010

Epoch 163/280
21/21            29s 1s/step - loss:
0.1873 - acc: 0.8862 - val_loss: 0.2480 - val_acc: 0.8403 - lr: 0.0010

Epoch 164/280
21/21            29s 1s/step - loss:
0.2937 - acc: 0.8865 - val_loss: 0.2447 - val_acc: 0.8407 - lr: 0.0010

Epoch 165/280
21/21            29s 1s/step - loss:
0.2850 - acc: 0.8867 - val_loss: 0.2774 - val_acc: 0.8410 - lr: 0.0010

Epoch 166/280
21/21            29s 1s/step - loss:
0.2819 - acc: 0.8869 - val_loss: 0.2696 - val_acc: 0.8412 - lr: 0.0010
```

```
Epoch 167/280
21/21             30s 1s/step - loss:
0.3262 - acc: 0.8871 - val_loss: 0.2242 - val_acc: 0.8416 - lr: 0.0010

Epoch 168/280
21/21             29s 1s/step - loss:
0.1989 - acc: 0.8873 - val_loss: 0.2016 - val_acc: 0.8420 - lr: 0.0010

Epoch 169/280
21/21             29s 1s/step - loss:
0.2676 - acc: 0.8876 - val_loss: 0.1965 - val_acc: 0.8425 - lr: 0.0010

Epoch 170/280
21/21             29s 1s/step - loss:
0.2222 - acc: 0.8878 - val_loss: 0.1840 - val_acc: 0.8431 - lr: 0.0010

2025-02-16 14:14:43.258906: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence


Epoch 171/280
21/21             29s 1s/step - loss:
0.1756 - acc: 0.8882 - val_loss: 0.1843 - val_acc: 0.8436 - lr: 0.0010

Epoch 172/280
21/21             29s 1s/step - loss:
0.2862 - acc: 0.8885 - val_loss: 0.2066 - val_acc: 0.8440 - lr: 0.0010

Epoch 173/280
21/21             29s 1s/step - loss:
0.2061 - acc: 0.8887 - val_loss: 0.2645 - val_acc: 0.8444 - lr: 0.0010

Epoch 174/280
21/21             29s 1s/step - loss:
0.3730 - acc: 0.8890 - val_loss: 0.2230 - val_acc: 0.8448 - lr: 0.0010

Epoch 175/280
21/21             29s 1s/step - loss:
0.2859 - acc: 0.8891 - val_loss: 0.2095 - val_acc: 0.8452 - lr: 0.0010

Epoch 176/280
21/21             29s 1s/step - loss:
0.1953 - acc: 0.8893 - val_loss: 0.2065 - val_acc: 0.8456 - lr: 0.0010

Epoch 177/280
21/21             29s 1s/step - loss:
0.1749 - acc: 0.8896 - val_loss: 0.1896 - val_acc: 0.8460 - lr: 0.0010

Epoch 178/280
```

```
21/21            29s 1s/step - loss:
0.3172 - acc: 0.8899 - val_loss: 0.1884 - val_acc: 0.8465 - lr: 0.0010

Epoch 179/280
21/21            29s 1s/step - loss:
0.1683 - acc: 0.8901 - val_loss: 0.1995 - val_acc: 0.8469 - lr: 0.0010

Epoch 180/280
21/21            29s 1s/step - loss:
0.2927 - acc: 0.8904 - val_loss: 0.1952 - val_acc: 0.8473 - lr: 0.0010

Epoch 181/280
21/21            29s 1s/step - loss:
0.1722 - acc: 0.8906 - val_loss: 0.1873 - val_acc: 0.8478 - lr: 0.0010

Epoch 182/280
21/21            29s 1s/step - loss:
0.2967 - acc: 0.8909 - val_loss: 0.2047 - val_acc: 0.8482 - lr: 0.0010

Epoch 183/280
21/21            29s 1s/step - loss:
0.2719 - acc: 0.8911 - val_loss: 0.2109 - val_acc: 0.8486 - lr: 0.0010

Epoch 184/280
21/21            29s 1s/step - loss:
0.2915 - acc: 0.8913 - val_loss: 0.2425 - val_acc: 0.8489 - lr: 0.0010

Epoch 185/280
21/21            29s 1s/step - loss:
0.3139 - acc: 0.8914 - val_loss: 0.2368 - val_acc: 0.8492 - lr: 0.0010

Epoch 186/280
21/21            29s 1s/step - loss:
0.1938 - acc: 0.8915 - val_loss: 0.2257 - val_acc: 0.8495 - lr: 0.0010

Epoch 187/280
21/21            29s 1s/step - loss:
0.1852 - acc: 0.8919 - val_loss: 0.1986 - val_acc: 0.8499 - lr: 0.0010

Epoch 188/280
21/21            29s 1s/step - loss:
0.4517 - acc: 0.8921 - val_loss: 0.1808 - val_acc: 0.8503 - lr: 0.0010

Epoch 189/280
21/21            30s 1s/step - loss:
0.3378 - acc: 0.8922 - val_loss: 0.1806 - val_acc: 0.8508 - lr: 0.0010

Epoch 190/280
```

```
21/21            30s 1s/step - loss:
0.2290 - acc: 0.8923 - val_loss: 0.1941 - val_acc: 0.8512 - lr: 0.0010

Epoch 191/280
21/21            29s 1s/step - loss:
0.2922 - acc: 0.8925 - val_loss: 0.2060 - val_acc: 0.8516 - lr: 0.0010

Epoch 192/280
21/21            30s 1s/step - loss:
0.2654 - acc: 0.8926 - val_loss: 0.2513 - val_acc: 0.8519 - lr: 0.0010

Epoch 193/280
21/21            29s 1s/step - loss:
0.1875 - acc: 0.8929 - val_loss: 0.2190 - val_acc: 0.8521 - lr: 0.0010

Epoch 194/280
21/21            29s 1s/step - loss:
0.1784 - acc: 0.8932 - val_loss: 0.2074 - val_acc: 0.8525 - lr: 0.0010

Epoch 195/280
21/21            29s 1s/step - loss:
0.2811 - acc: 0.8934 - val_loss: 0.2068 - val_acc: 0.8528 - lr: 0.0010

Epoch 196/280
21/21            29s 1s/step - loss:
0.2217 - acc: 0.8936 - val_loss: 0.1877 - val_acc: 0.8532 - lr: 0.0010

Epoch 197/280
21/21            29s 1s/step - loss:
0.2531 - acc: 0.8938 - val_loss: 0.1797 - val_acc: 0.8536 - lr: 0.0010

Epoch 198/280
21/21            29s 1s/step - loss:
0.2153 - acc: 0.8941 - val_loss: 0.2117 - val_acc: 0.8539 - lr: 0.0010

Epoch 199/280
21/21            29s 1s/step - loss:
0.1964 - acc: 0.8943 - val_loss: 0.2176 - val_acc: 0.8542 - lr: 0.0010

Epoch 200/280
21/21            29s 1s/step - loss:
0.3387 - acc: 0.8945 - val_loss: 0.2071 - val_acc: 0.8545 - lr: 0.0010

Epoch 201/280
21/21            29s 1s/step - loss:
0.3362 - acc: 0.8946 - val_loss: 0.2217 - val_acc: 0.8548 - lr: 0.0010

Epoch 202/280
```

```
21/21             29s 1s/step - loss:
0.1828 - acc: 0.8948 - val_loss: 0.2330 - val_acc: 0.8551 - lr: 0.0010

Epoch 203/280
21/21             30s 1s/step - loss:
0.1701 - acc: 0.8951 - val_loss: 0.2213 - val_acc: 0.8554 - lr: 0.0010

Epoch 204/280
21/21             29s 1s/step - loss:
0.1676 - acc: 0.8954 - val_loss: 0.2460 - val_acc: 0.8557 - lr: 0.0010

Epoch 205/280
21/21             29s 1s/step - loss:
0.2962 - acc: 0.8956 - val_loss: 0.2415 - val_acc: 0.8560 - lr: 0.0010

Epoch 206/280
21/21             29s 1s/step - loss:
0.2526 - acc: 0.8957 - val_loss: 0.2262 - val_acc: 0.8562 - lr: 0.0010

Epoch 207/280
21/21             29s 1s/step - loss:
0.2084 - acc: 0.8959 - val_loss: 0.2294 - val_acc: 0.8565 - lr: 0.0010

Epoch 208/280
21/21             28s 1s/step - loss:
0.3878 - acc: 0.8961 - val_loss: 0.2648 - val_acc: 0.8567 - lr: 0.0010

Epoch 209/280
21/21             29s 1s/step - loss:
0.2940 - acc: 0.8961 - val_loss: 0.2721 - val_acc: 0.8568 - lr: 0.0010

Epoch 210/280
21/21             29s 1s/step - loss:
0.2554 - acc: 0.8962 - val_loss: 0.2155 - val_acc: 0.8571 - lr: 0.0010
```



```
Epoch 211/280
21/21            30s 1s/step - loss:
0.1908 - acc: 0.8964 - val_loss: 0.1964 - val_acc: 0.8574 - lr: 0.0010

Epoch 212/280
21/21            29s 1s/step - loss:
0.1737 - acc: 0.8967 - val_loss: 0.1790 - val_acc: 0.8578 - lr: 0.0010

Epoch 213/280
21/21            29s 1s/step - loss:
0.3036 - acc: 0.8969 - val_loss: 0.1687 - val_acc: 0.8581 - lr: 0.0010

Epoch 214/280
21/21            28s 1s/step - loss:
0.3218 - acc: 0.8970 - val_loss: 0.1711 - val_acc: 0.8585 - lr: 0.0010

Epoch 215/280
21/21            29s 1s/step - loss:
0.2970 - acc: 0.8972 - val_loss: 0.1945 - val_acc: 0.8588 - lr: 0.0010

Epoch 216/280
21/21            29s 1s/step - loss:
0.3392 - acc: 0.8973 - val_loss: 0.2589 - val_acc: 0.8590 - lr: 0.0010

Epoch 217/280
21/21            29s 1s/step - loss:
0.2386 - acc: 0.8974 - val_loss: 0.2556 - val_acc: 0.8591 - lr: 0.0010

Epoch 218/280
21/21            29s 1s/step - loss:
0.1867 - acc: 0.8976 - val_loss: 0.2213 - val_acc: 0.8594 - lr: 0.0010

Epoch 219/280
21/21            29s 1s/step - loss:
0.2676 - acc: 0.8978 - val_loss: 0.2156 - val_acc: 0.8596 - lr: 0.0010

Epoch 220/280
21/21            29s 1s/step - loss:
0.3858 - acc: 0.8979 - val_loss: 0.2358 - val_acc: 0.8599 - lr: 0.0010

Epoch 221/280
21/21            29s 1s/step - loss:
0.1782 - acc: 0.8980 - val_loss: 0.2229 - val_acc: 0.8601 - lr: 0.0010

Epoch 222/280
21/21            29s 1s/step - loss:
0.3832 - acc: 0.8982 - val_loss: 0.1987 - val_acc: 0.8604 - lr: 0.0010
```

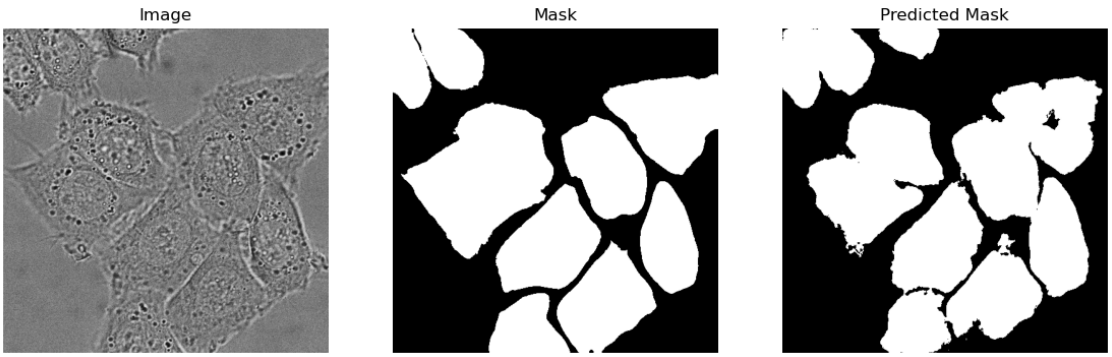
```
Epoch 223/280
21/21            30s 1s/step - loss:
0.4004 - acc: 0.8982 - val_loss: 0.2222 - val_acc: 0.8606 - lr: 0.0010

Epoch 224/280
21/21            30s 1s/step - loss:
0.2108 - acc: 0.8982 - val_loss: 0.2450 - val_acc: 0.8609 - lr: 0.0010

Epoch 225/280
21/21            29s 1s/step - loss:
0.2826 - acc: 0.8984 - val_loss: 0.2276 - val_acc: 0.8611 - lr: 0.0010

Epoch 226/280
21/21            29s 1s/step - loss:
0.2116 - acc: 0.8985 - val_loss: 0.2313 - val_acc: 0.8613 - lr: 0.0010

Epoch 227/280
21/21            30s 1s/step - loss:
0.3052 - acc: 0.8987 - val_loss: 0.2244 - val_acc: 0.8615 - lr: 0.0010

Epoch 228/280
21/21            30s 1s/step - loss:
0.3092 - acc: 0.8988 - val_loss: 0.2085 - val_acc: 0.8618 - lr: 0.0010

Epoch 229/280
21/21            30s 1s/step - loss:
0.2528 - acc: 0.8989 - val_loss: 0.2046 - val_acc: 0.8621 - lr: 0.0010

Epoch 230/280
21/21            30s 1s/step - loss:
0.1659 - acc: 0.8990 - val_loss: 0.2019 - val_acc: 0.8623 - lr: 0.0010

Epoch 231/280
21/21            30s 1s/step - loss:
0.2817 - acc: 0.8993 - val_loss: 0.1957 - val_acc: 0.8626 - lr: 0.0010

Epoch 232/280
21/21            30s 1s/step - loss:
0.3188 - acc: 0.8993 - val_loss: 0.2073 - val_acc: 0.8628 - lr: 0.0010

Epoch 233/280
21/21            29s 1s/step - loss:
0.3048 - acc: 0.8994 - val_loss: 0.2276 - val_acc: 0.8630 - lr: 0.0010

Epoch 234/280
21/21            30s 1s/step - loss:
0.2974 - acc: 0.8995 - val_loss: 0.2610 - val_acc: 0.8632 - lr: 0.0010
```

```
Epoch 235/280
21/21            29s 1s/step - loss:
0.1693 - acc: 0.8997 - val_loss: 0.2215 - val_acc: 0.8634 - lr: 0.0010

Epoch 236/280
21/21            30s 1s/step - loss:
0.2254 - acc: 0.8999 - val_loss: 0.2004 - val_acc: 0.8636 - lr: 0.0010

Epoch 237/280
21/21            30s 1s/step - loss:
0.1600 - acc: 0.9001 - val_loss: 0.2058 - val_acc: 0.8639 - lr: 0.0010

Epoch 238/280
21/21            30s 1s/step - loss:
0.2923 - acc: 0.9003 - val_loss: 0.2113 - val_acc: 0.8641 - lr: 0.0010

Epoch 239/280
21/21            30s 1s/step - loss:
0.3515 - acc: 0.9003 - val_loss: 0.2372 - val_acc: 0.8643 - lr: 0.0010

Epoch 240/280
21/21            48s 2s/step - loss:
0.1779 - acc: 0.9004 - val_loss: 0.3315 - val_acc: 0.8643 - lr: 0.0010

Epoch 241/280
21/21            30s 997ms/step -
loss: 0.3604 - acc: 0.9006 - val_loss: 0.3208 - val_acc: 0.8643 - lr: 0.0010

Epoch 242/280
21/21            29s 1s/step - loss:
0.2773 - acc: 0.9006 - val_loss: 0.2622 - val_acc: 0.8643 - lr: 0.0010

Epoch 243/280
21/21            30s 1s/step - loss:
0.2039 - acc: 0.9007 - val_loss: 0.2082 - val_acc: 0.8645 - lr: 0.0010

Epoch 244/280
21/21            30s 1s/step - loss:
0.3137 - acc: 0.9008 - val_loss: 0.1922 - val_acc: 0.8648 - lr: 0.0010

Epoch 245/280
21/21            30s 1s/step - loss:
0.2793 - acc: 0.9009 - val_loss: 0.1982 - val_acc: 0.8650 - lr: 0.0010

Epoch 246/280
21/21            29s 1s/step - loss:
0.3022 - acc: 0.9010 - val_loss: 0.2190 - val_acc: 0.8652 - lr: 0.0010
```

```
Epoch 247/280
21/21            30s 1s/step - loss:
0.3016 - acc: 0.9010 - val_loss: 0.2164 - val_acc: 0.8655 - lr: 0.0010

Epoch 248/280
21/21            30s 1s/step - loss:
0.2896 - acc: 0.9011 - val_loss: 0.2223 - val_acc: 0.8657 - lr: 0.0010

Epoch 249/280
21/21            29s 1s/step - loss:
0.2854 - acc: 0.9011 - val_loss: 0.2113 - val_acc: 0.8659 - lr: 0.0010

Epoch 250/280
21/21            29s 1s/step - loss:
0.2289 - acc: 0.9012 - val_loss: 0.2075 - val_acc: 0.8661 - lr: 0.0010

Epoch 251/280
21/21            30s 1s/step - loss:
0.2642 - acc: 0.9013 - val_loss: 0.1926 - val_acc: 0.8664 - lr: 0.0010

Epoch 252/280
21/21            30s 1s/step - loss:
0.2211 - acc: 0.9014 - val_loss: 0.1815 - val_acc: 0.8666 - lr: 0.0010

Epoch 253/280
21/21            29s 1s/step - loss:
0.2714 - acc: 0.9015 - val_loss: 0.1773 - val_acc: 0.8669 - lr: 0.0010

Epoch 254/280
21/21            30s 1s/step - loss:
0.2920 - acc: 0.9016 - val_loss: 0.1810 - val_acc: 0.8672 - lr: 0.0010

Epoch 255/280
21/21            30s 1s/step - loss:
0.3798 - acc: 0.9017 - val_loss: 0.2021 - val_acc: 0.8674 - lr: 0.0010

Epoch 256/280
21/21            30s 1s/step - loss:
0.2506 - acc: 0.9017 - val_loss: 0.2761 - val_acc: 0.8675 - lr: 0.0010

Epoch 257/280
21/21            29s 1s/step - loss:
0.2530 - acc: 0.9018 - val_loss: 0.2720 - val_acc: 0.8676 - lr: 0.0010

Epoch 258/280
21/21            29s 1s/step - loss:
0.2115 - acc: 0.9019 - val_loss: 0.2181 - val_acc: 0.8678 - lr: 0.0010
```

```
Epoch 259/280
21/21            29s 1s/step - loss:
0.3139 - acc: 0.9020 - val_loss: 0.1860 - val_acc: 0.8680 - lr: 0.0010

Epoch 260/280
21/21            28s 1s/step - loss:
0.2832 - acc: 0.9021 - val_loss: 0.1951 - val_acc: 0.8683 - lr: 0.0010

Epoch 261/280
21/21            29s 1s/step - loss:
0.3180 - acc: 0.9021 - val_loss: 0.2403 - val_acc: 0.8684 - lr: 0.0010

Epoch 262/280
21/21            30s 1s/step - loss:
0.1841 - acc: 0.9022 - val_loss: 0.2083 - val_acc: 0.8686 - lr: 0.0010

Epoch 263/280
21/21            28s 1s/step - loss:
0.2835 - acc: 0.9024 - val_loss: 0.1794 - val_acc: 0.8688 - lr: 0.0010

Epoch 264/280
21/21            29s 1s/step - loss:
0.2868 - acc: 0.9024 - val_loss: 0.1726 - val_acc: 0.8691 - lr: 0.0010

Epoch 265/280
21/21            30s 1s/step - loss:
0.2755 - acc: 0.9025 - val_loss: 0.2163 - val_acc: 0.8693 - lr: 0.0010

Epoch 266/280
21/21            30s 1s/step - loss:
0.2046 - acc: 0.9026 - val_loss: 0.3115 - val_acc: 0.8694 - lr: 0.0010

Epoch 267/280
21/21            29s 1s/step - loss:
0.1838 - acc: 0.9028 - val_loss: 0.2577 - val_acc: 0.8694 - lr: 0.0010

Epoch 268/280
21/21            30s 1s/step - loss:
0.2755 - acc: 0.9029 - val_loss: 0.2144 - val_acc: 0.8696 - lr: 0.0010

Epoch 269/280
21/21            29s 1s/step - loss:
0.2597 - acc: 0.9030 - val_loss: 0.1838 - val_acc: 0.8698 - lr: 0.0010

Epoch 270/280
21/21            30s 1s/step - loss:
0.4274 - acc: 0.9031 - val_loss: 0.1815 - val_acc: 0.8700 - lr: 0.0010
```

```
Epoch 271/280
21/21            29s 1s/step - loss:
0.1692 - acc: 0.9032 - val_loss: 0.2505 - val_acc: 0.8701 - lr: 0.0010

Epoch 272/280
21/21            30s 1s/step - loss:
0.2480 - acc: 0.9033 - val_loss: 0.2119 - val_acc: 0.8703 - lr: 0.0010

Epoch 273/280
21/21            30s 1s/step - loss:
0.2426 - acc: 0.9034 - val_loss: 0.1952 - val_acc: 0.8705 - lr: 0.0010

Epoch 274/280
21/21            30s 1s/step - loss:
0.2459 - acc: 0.9035 - val_loss: 0.1962 - val_acc: 0.8707 - lr: 0.0010

Epoch 275/280
21/21            30s 1s/step - loss:
0.2855 - acc: 0.9036 - val_loss: 0.2067 - val_acc: 0.8709 - lr: 0.0010

Epoch 276/280
21/21            30s 1s/step - loss:
0.2726 - acc: 0.9036 - val_loss: 0.2280 - val_acc: 0.8710 - lr: 0.0010

Epoch 277/280
21/21            30s 1s/step - loss:
0.3590 - acc: 0.9037 - val_loss: 0.2345 - val_acc: 0.8712 - lr: 0.0010

Epoch 278/280
21/21            30s 1s/step - loss:
0.2386 - acc: 0.9037 - val_loss: 0.2376 - val_acc: 0.8713 - lr: 0.0010

Epoch 279/280
21/21            30s 1s/step - loss:
0.2770 - acc: 0.9038 - val_loss: 0.2251 - val_acc: 0.8714 - lr: 0.0010

Epoch 280/280
21/21            29s 1s/step - loss:
0.2055 - acc: 0.9039 - val_loss: 0.2204 - val_acc: 0.8716 - lr: 0.0010
```




```
W0000 00:00:1739729335.469907 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.

6/6             4s 504ms/step

W0000 00:00:1739729340.753543 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.
W0000 00:00:1739729340.869266 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.


Epoch 1/280

E0000 00:00:1739729356.806005 1711261 meta_optimizer.cc:966] layout failed:
INVALID_ARGUMENT: Size of values 0 does not match size of permutation 4 @ fanin
shape inStatefulPartitionedCall/sequential_1/u_net_1/spatial_dropout2d_1/statele
ss_dropout/SelectV2-2-TransposeNHWCToNCHW-LayoutOptimizer

21/21             37s 1s/step - loss:
1.0237 - acc: 0.4938 - val_loss: 0.6991 - val_acc: 0.5096 - lr: 0.0010

Epoch 2/280
21/21             29s 1s/step - loss:
0.8329 - acc: 0.5661 - val_loss: 0.6888 - val_acc: 0.5111 - lr: 0.0010

Epoch 3/280
21/21             29s 995ms/step -
loss: 0.7141 - acc: 0.6243 - val_loss: 0.6948 - val_acc: 0.5112 - lr: 0.0010

Epoch 4/280
21/21             29s 1s/step - loss:
0.6155 - acc: 0.6654 - val_loss: 0.6972 - val_acc: 0.5105 - lr: 0.0010

Epoch 5/280
```

```
21/21            29s 1s/step - loss:
0.5537 - acc: 0.6902 - val_loss: 0.6994 - val_acc: 0.5100 - lr: 0.0010

Epoch 6/280
21/21            29s 1s/step - loss:
0.5135 - acc: 0.7089 - val_loss: 0.7053 - val_acc: 0.5096 - lr: 0.0010

Epoch 7/280
21/21            29s 1s/step - loss:
0.5659 - acc: 0.7244 - val_loss: 0.7269 - val_acc: 0.5094 - lr: 0.0010

Epoch 8/280
21/21            29s 1s/step - loss:
0.4565 - acc: 0.7367 - val_loss: 0.7501 - val_acc: 0.5093 - lr: 0.0010

Epoch 9/280
21/21            28s 1s/step - loss:
0.4294 - acc: 0.7499 - val_loss: 0.8093 - val_acc: 0.5092 - lr: 0.0010

Epoch 10/280
21/21            29s 1s/step - loss:
0.4365 - acc: 0.7608 - val_loss: 0.9205 - val_acc: 0.5095 - lr: 0.0010

Epoch 11/280
21/21            29s 1s/step - loss:
0.3921 - acc: 0.7699 - val_loss: 1.0514 - val_acc: 0.5099 - lr: 0.0010

Epoch 12/280
21/21            29s 1s/step - loss:
0.4745 - acc: 0.7780 - val_loss: 1.1981 - val_acc: 0.5105 - lr: 0.0010

Epoch 13/280
21/21            29s 1s/step - loss:
0.3975 - acc: 0.7840 - val_loss: 1.1573 - val_acc: 0.5115 - lr: 0.0010

Epoch 14/280
21/21            29s 1s/step - loss:
0.4479 - acc: 0.7897 - val_loss: 1.0939 - val_acc: 0.5135 - lr: 0.0010

Epoch 15/280
21/21            29s 1s/step - loss:
0.5086 - acc: 0.7939 - val_loss: 1.0687 - val_acc: 0.5166 - lr: 0.0010

Epoch 16/280
21/21            29s 1s/step - loss:
0.4517 - acc: 0.7976 - val_loss: 0.9743 - val_acc: 0.5211 - lr: 0.0010

Epoch 17/280
```

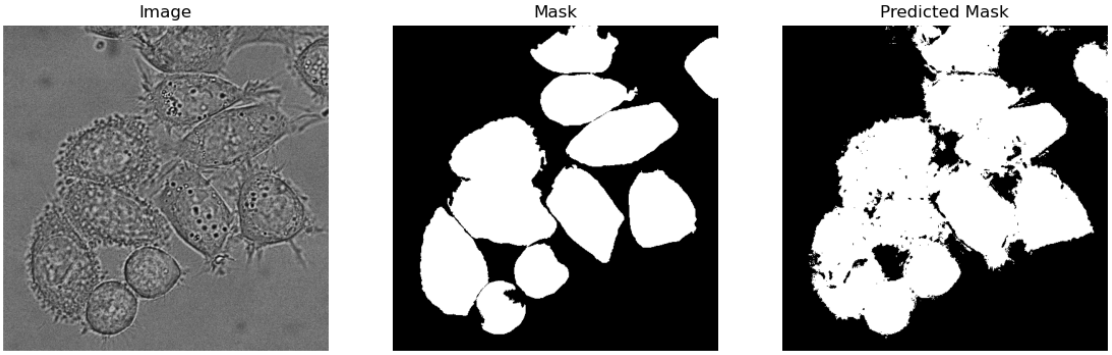
```
21/21            29s 1s/step - loss:
0.3807 - acc: 0.8014 - val_loss: 0.8659 - val_acc: 0.5269 - lr: 0.0010

Epoch 18/280
21/21            29s 1s/step - loss:
0.4492 - acc: 0.8052 - val_loss: 0.8370 - val_acc: 0.5328 - lr: 0.0010

Epoch 19/280
21/21            29s 1s/step - loss:
0.4053 - acc: 0.8080 - val_loss: 0.7033 - val_acc: 0.5391 - lr: 0.0010

Epoch 20/280
21/21            29s 1s/step - loss:
0.3758 - acc: 0.8113 - val_loss: 0.5892 - val_acc: 0.5468 - lr: 0.0010

Epoch 21/280
21/21            29s 1s/step - loss:
0.3507 - acc: 0.8146 - val_loss: 0.6285 - val_acc: 0.5543 - lr: 0.0010

Epoch 22/280
21/21            29s 1s/step - loss:
0.3106 - acc: 0.8182 - val_loss: 0.6568 - val_acc: 0.5611 - lr: 0.0010

Epoch 23/280
21/21            29s 1s/step - loss:
0.3127 - acc: 0.8218 - val_loss: 0.6369 - val_acc: 0.5682 - lr: 0.0010

Epoch 24/280
21/21            30s 1s/step - loss:
0.4009 - acc: 0.8248 - val_loss: 0.4826 - val_acc: 0.5766 - lr: 0.0010

Epoch 25/280
21/21            29s 1s/step - loss:
0.3005 - acc: 0.8274 - val_loss: 0.3517 - val_acc: 0.5865 - lr: 0.0010

Epoch 26/280
21/21            30s 1s/step - loss:
0.3989 - acc: 0.8301 - val_loss: 0.3247 - val_acc: 0.5968 - lr: 0.0010

Epoch 27/280
21/21            29s 1s/step - loss:
0.3764 - acc: 0.8319 - val_loss: 0.3639 - val_acc: 0.6059 - lr: 0.0010

Epoch 28/280
21/21            29s 1s/step - loss:
0.2871 - acc: 0.8341 - val_loss: 0.3345 - val_acc: 0.6146 - lr: 0.0010

Epoch 29/280
```

```
21/21            29s 1s/step - loss:
0.2815 - acc: 0.8368 - val_loss: 0.3082 - val_acc: 0.6231 - lr: 0.0010

Epoch 30/280
21/21            29s 1s/step - loss:
0.3074 - acc: 0.8394 - val_loss: 0.4062 - val_acc: 0.6302 - lr: 0.0010

Epoch 31/280
21/21            30s 1s/step - loss:
0.3134 - acc: 0.8415 - val_loss: 0.3091 - val_acc: 0.6374 - lr: 0.0010

Epoch 32/280
21/21            29s 1s/step - loss:
0.2701 - acc: 0.8435 - val_loss: 0.2851 - val_acc: 0.6447 - lr: 0.0010

Epoch 33/280
21/21            29s 1s/step - loss:
0.3661 - acc: 0.8457 - val_loss: 0.3011 - val_acc: 0.6516 - lr: 0.0010

Epoch 34/280
21/21            29s 1s/step - loss:
0.3624 - acc: 0.8472 - val_loss: 0.2943 - val_acc: 0.6580 - lr: 0.0010

Epoch 35/280
21/21            30s 1s/step - loss:
0.4309 - acc: 0.8485 - val_loss: 0.2892 - val_acc: 0.6641 - lr: 0.0010

Epoch 36/280
21/21            30s 1s/step - loss:
0.3642 - acc: 0.8495 - val_loss: 0.3306 - val_acc: 0.6697 - lr: 0.0010

Epoch 37/280
21/21            30s 1s/step - loss:
0.3740 - acc: 0.8506 - val_loss: 0.3545 - val_acc: 0.6747 - lr: 0.0010

Epoch 38/280
21/21            30s 1s/step - loss:
0.2739 - acc: 0.8518 - val_loss: 0.3006 - val_acc: 0.6797 - lr: 0.0010

Epoch 39/280
21/21            31s 1s/step - loss:
0.3872 - acc: 0.8535 - val_loss: 0.2948 - val_acc: 0.6847 - lr: 0.0010

Epoch 40/280
21/21            30s 1s/step - loss:
0.4115 - acc: 0.8543 - val_loss: 0.2969 - val_acc: 0.6895 - lr: 0.0010

Epoch 41/280
```

```
21/21            30s 1s/step - loss:
0.4383 - acc: 0.8550 - val_loss: 0.2856 - val_acc: 0.6941 - lr: 0.0010

Epoch 42/280
21/21            30s 1s/step - loss:
0.4300 - acc: 0.8555 - val_loss: 0.2879 - val_acc: 0.6986 - lr: 0.0010

Epoch 43/280
21/21            30s 1s/step - loss:
0.3246 - acc: 0.8561 - val_loss: 0.3283 - val_acc: 0.7028 - lr: 0.0010

Epoch 44/280
21/21            31s 1s/step - loss:
0.3837 - acc: 0.8572 - val_loss: 0.3226 - val_acc: 0.7067 - lr: 0.0010

Epoch 45/280
21/21            29s 1s/step - loss:
0.3057 - acc: 0.8579 - val_loss: 0.2904 - val_acc: 0.7106 - lr: 0.0010

Epoch 46/280
21/21            29s 1s/step - loss:
0.3336 - acc: 0.8590 - val_loss: 0.2729 - val_acc: 0.7144 - lr: 0.0010

Epoch 47/280
21/21            30s 1s/step - loss:
0.3285 - acc: 0.8599 - val_loss: 0.2627 - val_acc: 0.7181 - lr: 0.0010

Epoch 48/280
21/21            30s 1s/step - loss:
0.4159 - acc: 0.8607 - val_loss: 0.2712 - val_acc: 0.7217 - lr: 0.0010

Epoch 49/280
21/21            30s 1s/step - loss:
0.2419 - acc: 0.8614 - val_loss: 0.2770 - val_acc: 0.7251 - lr: 0.0010

Epoch 50/280
21/21            30s 1s/step - loss:
0.2353 - acc: 0.8627 - val_loss: 0.2711 - val_acc: 0.7284 - lr: 0.0010

Epoch 51/280
21/21            30s 1s/step - loss:
0.3039 - acc: 0.8640 - val_loss: 0.3490 - val_acc: 0.7310 - lr: 0.0010

Epoch 52/280
21/21            30s 1s/step - loss:
0.3690 - acc: 0.8649 - val_loss: 0.2487 - val_acc: 0.7338 - lr: 0.0010

Epoch 53/280
```

```
21/21            30s 1s/step - loss:
0.3632 - acc: 0.8655 - val_loss: 0.2495 - val_acc: 0.7369 - lr: 0.0010

Epoch 54/280
21/21            30s 1s/step - loss:
0.2943 - acc: 0.8660 - val_loss: 0.3026 - val_acc: 0.7396 - lr: 0.0010

Epoch 55/280
21/21            30s 1s/step - loss:
0.3805 - acc: 0.8668 - val_loss: 0.2695 - val_acc: 0.7422 - lr: 0.0010

Epoch 56/280
21/21            29s 1s/step - loss:
0.3820 - acc: 0.8672 - val_loss: 0.2808 - val_acc: 0.7449 - lr: 0.0010

Epoch 57/280
21/21            30s 1s/step - loss:
0.3248 - acc: 0.8677 - val_loss: 0.2735 - val_acc: 0.7476 - lr: 0.0010

Epoch 58/280
21/21            30s 1s/step - loss:
0.3441 - acc: 0.8684 - val_loss: 0.2577 - val_acc: 0.7501 - lr: 0.0010

Epoch 59/280
21/21            29s 1s/step - loss:
0.3861 - acc: 0.8689 - val_loss: 0.2678 - val_acc: 0.7526 - lr: 0.0010

Epoch 60/280
21/21            30s 1s/step - loss:
0.3561 - acc: 0.8693 - val_loss: 0.2859 - val_acc: 0.7549 - lr: 0.0010

2025-02-16 15:38:38.301032: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence
         [[{{node MultiDeviceIteratorGetNextFromShard}}]]
         [[RemoteCall]]


Epoch 61/280
21/21            30s 1s/step - loss:
0.3863 - acc: 0.8697 - val_loss: 0.2402 - val_acc: 0.7573 - lr: 0.0010

Epoch 62/280
21/21            30s 1s/step - loss:
0.3072 - acc: 0.8701 - val_loss: 0.2480 - val_acc: 0.7597 - lr: 0.0010

Epoch 63/280
21/21            30s 1s/step - loss:
0.3908 - acc: 0.8708 - val_loss: 0.2508 - val_acc: 0.7619 - lr: 0.0010
```

```
Epoch 64/280
21/21             30s 1s/step - loss:
0.3152 - acc: 0.8713 - val_loss: 0.2614 - val_acc: 0.7640 - lr: 0.0010

Epoch 65/280
21/21             30s 1s/step - loss:
0.3451 - acc: 0.8719 - val_loss: 0.2859 - val_acc: 0.7658 - lr: 0.0010

Epoch 66/280
21/21             30s 1s/step - loss:
0.4571 - acc: 0.8723 - val_loss: 0.2651 - val_acc: 0.7676 - lr: 0.0010

Epoch 67/280
21/21             30s 1s/step - loss:
0.3415 - acc: 0.8726 - val_loss: 0.2552 - val_acc: 0.7695 - lr: 0.0010

Epoch 68/280
21/21             30s 1s/step - loss:
0.2636 - acc: 0.8731 - val_loss: 0.2585 - val_acc: 0.7713 - lr: 0.0010

Epoch 69/280
21/21             30s 1s/step - loss:
0.2986 - acc: 0.8738 - val_loss: 0.2461 - val_acc: 0.7732 - lr: 0.0010

Epoch 70/280
21/21             30s 1s/step - loss:
0.3019 - acc: 0.8744 - val_loss: 0.2403 - val_acc: 0.7751 - lr: 0.0010
```




```
Epoch 71/280
21/21             30s 1s/step - loss:
0.4466 - acc: 0.8749 - val_loss: 0.2378 - val_acc: 0.7769 - lr: 0.0010

Epoch 72/280
21/21             30s 1s/step - loss:
```

```
0.3971 - acc: 0.8750 - val_loss: 0.2826 - val_acc: 0.7785 - lr: 0.0010

Epoch 73/280
21/21            30s 1s/step - loss:
0.3735 - acc: 0.8751 - val_loss: 0.2731 - val_acc: 0.7801 - lr: 0.0010

Epoch 74/280
21/21            30s 1s/step - loss:
0.3614 - acc: 0.8754 - val_loss: 0.2643 - val_acc: 0.7817 - lr: 0.0010

Epoch 75/280
21/21            30s 1s/step - loss:
0.3486 - acc: 0.8757 - val_loss: 0.2877 - val_acc: 0.7832 - lr: 0.0010

Epoch 76/280
21/21            30s 1s/step - loss:
0.3486 - acc: 0.8760 - val_loss: 0.2541 - val_acc: 0.7847 - lr: 0.0010

Epoch 77/280
21/21            30s 1s/step - loss:
0.3041 - acc: 0.8764 - val_loss: 0.2557 - val_acc: 0.7862 - lr: 0.0010

Epoch 78/280
21/21            30s 1s/step - loss:
0.3763 - acc: 0.8768 - val_loss: 0.2286 - val_acc: 0.7877 - lr: 0.0010

Epoch 79/280
21/21            30s 1s/step - loss:
0.2610 - acc: 0.8772 - val_loss: 0.2346 - val_acc: 0.7892 - lr: 0.0010

Epoch 80/280
21/21            30s 1s/step - loss:
0.3324 - acc: 0.8777 - val_loss: 0.2451 - val_acc: 0.7906 - lr: 0.0010

Epoch 81/280
21/21            30s 1s/step - loss:
0.3873 - acc: 0.8780 - val_loss: 0.2411 - val_acc: 0.7921 - lr: 0.0010

Epoch 82/280
21/21            29s 1s/step - loss:
0.3148 - acc: 0.8783 - val_loss: 0.2405 - val_acc: 0.7935 - lr: 0.0010

Epoch 83/280
21/21            30s 1s/step - loss:
0.3382 - acc: 0.8787 - val_loss: 0.2778 - val_acc: 0.7946 - lr: 0.0010

Epoch 84/280
21/21            30s 1s/step - loss:
```

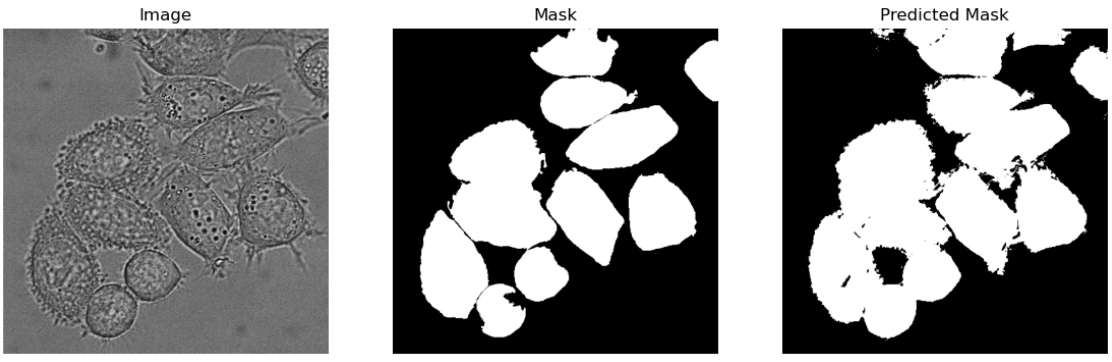
```
0.2517 - acc: 0.8790 - val_loss: 0.2449 - val_acc: 0.7959 - lr: 0.0010

Epoch 85/280
21/21            29s 1s/step - loss:
0.3911 - acc: 0.8795 - val_loss: 0.2823 - val_acc: 0.7971 - lr: 0.0010

Epoch 86/280
21/21            30s 1s/step - loss:
0.3027 - acc: 0.8797 - val_loss: 0.2400 - val_acc: 0.7983 - lr: 0.0010

Epoch 87/280
21/21            29s 1s/step - loss:
0.2953 - acc: 0.8801 - val_loss: 0.2273 - val_acc: 0.7996 - lr: 0.0010

Epoch 88/280
21/21            30s 1s/step - loss:
0.3221 - acc: 0.8805 - val_loss: 0.2364 - val_acc: 0.8009 - lr: 0.0010

Epoch 89/280
21/21            30s 1s/step - loss:
0.3570 - acc: 0.8808 - val_loss: 0.2763 - val_acc: 0.8019 - lr: 0.0010

Epoch 90/280
21/21            30s 1s/step - loss:
0.3086 - acc: 0.8811 - val_loss: 0.2358 - val_acc: 0.8030 - lr: 0.0010

Epoch 91/280
21/21            29s 1s/step - loss:
0.3819 - acc: 0.8814 - val_loss: 0.2314 - val_acc: 0.8042 - lr: 0.0010

Epoch 92/280
21/21            29s 1s/step - loss:
0.3528 - acc: 0.8815 - val_loss: 0.2509 - val_acc: 0.8054 - lr: 0.0010

Epoch 93/280
21/21            30s 1s/step - loss:
0.3234 - acc: 0.8818 - val_loss: 0.2561 - val_acc: 0.8064 - lr: 0.0010

Epoch 94/280
21/21            30s 1s/step - loss:
0.3796 - acc: 0.8820 - val_loss: 0.2636 - val_acc: 0.8073 - lr: 0.0010

Epoch 95/280
21/21            30s 1s/step - loss:
0.3026 - acc: 0.8822 - val_loss: 0.2481 - val_acc: 0.8083 - lr: 0.0010

Epoch 96/280
21/21            30s 1s/step - loss:
```

```
0.3116 - acc: 0.8825 - val_loss: 0.2446 - val_acc: 0.8093 - lr: 0.0010

Epoch 97/280
21/21            29s 1s/step - loss:
0.2952 - acc: 0.8828 - val_loss: 0.2306 - val_acc: 0.8104 - lr: 0.0010

Epoch 98/280
21/21            30s 1s/step - loss:
0.3157 - acc: 0.8831 - val_loss: 0.2357 - val_acc: 0.8114 - lr: 0.0010

Epoch 99/280
21/21            30s 1s/step - loss:
0.3468 - acc: 0.8834 - val_loss: 0.2402 - val_acc: 0.8123 - lr: 0.0010

Epoch 100/280
21/21            30s 1s/step - loss:
0.3273 - acc: 0.8836 - val_loss: 0.2393 - val_acc: 0.8133 - lr: 0.0010

Epoch 101/280
21/21            30s 1s/step - loss:
0.3031 - acc: 0.8839 - val_loss: 0.2442 - val_acc: 0.8142 - lr: 0.0010

Epoch 102/280
21/21            29s 1s/step - loss:
0.3740 - acc: 0.8842 - val_loss: 0.2368 - val_acc: 0.8152 - lr: 0.0010

Epoch 103/280
21/21            30s 1s/step - loss:
0.2890 - acc: 0.8844 - val_loss: 0.2399 - val_acc: 0.8161 - lr: 0.0010

Epoch 104/280
21/21            30s 1s/step - loss:
0.2820 - acc: 0.8847 - val_loss: 0.2884 - val_acc: 0.8168 - lr: 0.0010

Epoch 105/280
21/21            30s 1s/step - loss:
0.2955 - acc: 0.8851 - val_loss: 0.2180 - val_acc: 0.8176 - lr: 0.0010

Epoch 106/280
21/21            29s 1s/step - loss:
0.3452 - acc: 0.8853 - val_loss: 0.2182 - val_acc: 0.8185 - lr: 0.0010

Epoch 107/280
21/21            30s 1s/step - loss:
0.3565 - acc: 0.8854 - val_loss: 0.2921 - val_acc: 0.8192 - lr: 0.0010

Epoch 108/280
21/21            30s 1s/step - loss:
```

```
0.2444 - acc: 0.8856 - val_loss: 0.2511 - val_acc: 0.8199 - lr: 0.0010

Epoch 109/280
21/21            30s 1s/step - loss:
0.2550 - acc: 0.8861 - val_loss: 0.2367 - val_acc: 0.8207 - lr: 0.0010

Epoch 110/280
21/21            30s 1s/step - loss:
0.2605 - acc: 0.8865 - val_loss: 0.2387 - val_acc: 0.8215 - lr: 0.0010

Epoch 111/280
21/21            30s 1s/step - loss:
0.3640 - acc: 0.8868 - val_loss: 0.2721 - val_acc: 0.8221 - lr: 0.0010

Epoch 112/280
21/21            29s 962ms/step -
loss: 0.3019 - acc: 0.8869 - val_loss: 0.2133 - val_acc: 0.8229 - lr: 0.0010

Epoch 113/280
21/21            28s 954ms/step -
loss: 0.2210 - acc: 0.8872 - val_loss: 0.2214 - val_acc: 0.8237 - lr: 0.0010

Epoch 114/280
21/21            28s 943ms/step -
loss: 0.2960 - acc: 0.8876 - val_loss: 0.2360 - val_acc: 0.8245 - lr: 0.0010

Epoch 115/280
21/21            28s 946ms/step -
loss: 0.2743 - acc: 0.8880 - val_loss: 0.2203 - val_acc: 0.8252 - lr: 0.0010

Epoch 116/280
21/21            28s 946ms/step -
loss: 0.3280 - acc: 0.8883 - val_loss: 0.2525 - val_acc: 0.8259 - lr: 0.0010

Epoch 117/280
21/21            29s 943ms/step -
loss: 0.3626 - acc: 0.8885 - val_loss: 0.2418 - val_acc: 0.8265 - lr: 0.0010

Epoch 118/280
21/21            28s 943ms/step -
loss: 0.2009 - acc: 0.8887 - val_loss: 0.2518 - val_acc: 0.8272 - lr: 0.0010

Epoch 119/280
21/21            29s 962ms/step -
loss: 0.4144 - acc: 0.8890 - val_loss: 0.2518 - val_acc: 0.8278 - lr: 0.0010

Epoch 120/280
21/21            28s 948ms/step -
```

```
loss: 0.2591 - acc: 0.8891 - val_loss: 0.2544 - val_acc: 0.8284 - lr: 0.0010

Epoch 121/280
21/21            29s 941ms/step -
loss: 0.3586 - acc: 0.8893 - val_loss: 0.2546 - val_acc: 0.8291 - lr: 0.0010

Epoch 122/280
21/21            28s 949ms/step -
loss: 0.2715 - acc: 0.8894 - val_loss: 0.2509 - val_acc: 0.8297 - lr: 0.0010

Epoch 123/280
21/21            28s 943ms/step -
loss: 0.3612 - acc: 0.8897 - val_loss: 0.2258 - val_acc: 0.8303 - lr: 0.0010

Epoch 124/280
21/21            27s 950ms/step -
loss: 0.1945 - acc: 0.8899 - val_loss: 0.2160 - val_acc: 0.8311 - lr: 0.0010

Epoch 125/280
21/21            28s 945ms/step -
loss: 0.3638 - acc: 0.8903 - val_loss: 0.2196 - val_acc: 0.8317 - lr: 0.0010

Epoch 126/280
21/21            28s 947ms/step -
loss: 0.3640 - acc: 0.8904 - val_loss: 0.2980 - val_acc: 0.8322 - lr: 0.0010

Epoch 127/280
21/21            28s 944ms/step -
loss: 0.2638 - acc: 0.8906 - val_loss: 0.2437 - val_acc: 0.8327 - lr: 0.0010

Epoch 128/280
21/21            28s 943ms/step -
loss: 0.1894 - acc: 0.8909 - val_loss: 0.2755 - val_acc: 0.8331 - lr: 0.0010

Epoch 129/280
21/21            28s 945ms/step -
loss: 0.2890 - acc: 0.8913 - val_loss: 0.3469 - val_acc: 0.8333 - lr: 0.0010

Epoch 130/280
21/21            29s 944ms/step -
loss: 0.2820 - acc: 0.8916 - val_loss: 0.2537 - val_acc: 0.8337 - lr: 0.0010

Epoch 131/280
21/21            48s 2s/step - loss:
0.2833 - acc: 0.8918 - val_loss: 0.2175 - val_acc: 0.8342 - lr: 0.0010

Epoch 132/280
21/21            28s 941ms/step -
```

```
loss: 0.3977 - acc: 0.8920 - val_loss: 0.2160 - val_acc: 0.8348 - lr: 0.0010

Epoch 133/280
21/21            28s 944ms/step -
loss: 0.1896 - acc: 0.8921 - val_loss: 0.2316 - val_acc: 0.8354 - lr: 0.0010

Epoch 134/280
21/21            28s 923ms/step -
loss: 0.1936 - acc: 0.8926 - val_loss: 0.2790 - val_acc: 0.8359 - lr: 0.0010

Epoch 135/280
21/21            28s 945ms/step -
loss: 0.1820 - acc: 0.8930 - val_loss: 0.2174 - val_acc: 0.8364 - lr: 0.0010

Epoch 136/280
21/21            27s 946ms/step -
loss: 0.3934 - acc: 0.8933 - val_loss: 0.2227 - val_acc: 0.8370 - lr: 0.0010

Epoch 137/280
21/21            28s 948ms/step -
loss: 0.3035 - acc: 0.8934 - val_loss: 0.2232 - val_acc: 0.8376 - lr: 0.0010

Epoch 138/280
21/21            28s 946ms/step -
loss: 0.3926 - acc: 0.8935 - val_loss: 0.2650 - val_acc: 0.8380 - lr: 0.0010

Epoch 139/280
21/21            28s 946ms/step -
loss: 0.1859 - acc: 0.8937 - val_loss: 0.2336 - val_acc: 0.8385 - lr: 0.0010

Epoch 140/280
21/21            28s 942ms/step -
loss: 0.2940 - acc: 0.8940 - val_loss: 0.2456 - val_acc: 0.8390 - lr: 0.0010
```



```
Epoch 141/280
21/21            28s 947ms/step -
loss: 0.3223 - acc: 0.8942 - val_loss: 0.2356 - val_acc: 0.8395 - lr: 0.0010

Epoch 142/280
21/21            28s 945ms/step -
loss: 0.3268 - acc: 0.8943 - val_loss: 0.2230 - val_acc: 0.8400 - lr: 0.0010

Epoch 143/280
21/21            28s 942ms/step -
loss: 0.1916 - acc: 0.8944 - val_loss: 0.2232 - val_acc: 0.8406 - lr: 0.0010

Epoch 144/280
21/21            28s 944ms/step -
loss: 0.2278 - acc: 0.8948 - val_loss: 0.2159 - val_acc: 0.8411 - lr: 0.0010

Epoch 145/280
21/21            28s 944ms/step -
loss: 0.1713 - acc: 0.8951 - val_loss: 0.2161 - val_acc: 0.8416 - lr: 0.0010

Epoch 146/280
21/21            29s 947ms/step -
loss: 0.2974 - acc: 0.8955 - val_loss: 0.2201 - val_acc: 0.8422 - lr: 0.0010

Epoch 147/280
21/21            28s 947ms/step -
loss: 0.1575 - acc: 0.8958 - val_loss: 0.2241 - val_acc: 0.8427 - lr: 0.0010

Epoch 148/280
21/21            28s 950ms/step -
loss: 0.2523 - acc: 0.8961 - val_loss: 0.2353 - val_acc: 0.8431 - lr: 0.0010

Epoch 149/280
21/21            28s 946ms/step -
loss: 0.3053 - acc: 0.8963 - val_loss: 0.2440 - val_acc: 0.8436 - lr: 0.0010

Epoch 150/280
21/21            28s 950ms/step -
loss: 0.3984 - acc: 0.8964 - val_loss: 0.2357 - val_acc: 0.8440 - lr: 0.0010

Epoch 151/280
21/21            27s 947ms/step -
loss: 0.3381 - acc: 0.8965 - val_loss: 0.3291 - val_acc: 0.8442 - lr: 0.0010

Epoch 152/280
21/21            28s 944ms/step -
loss: 0.3277 - acc: 0.8966 - val_loss: 0.2740 - val_acc: 0.8445 - lr: 0.0010
```

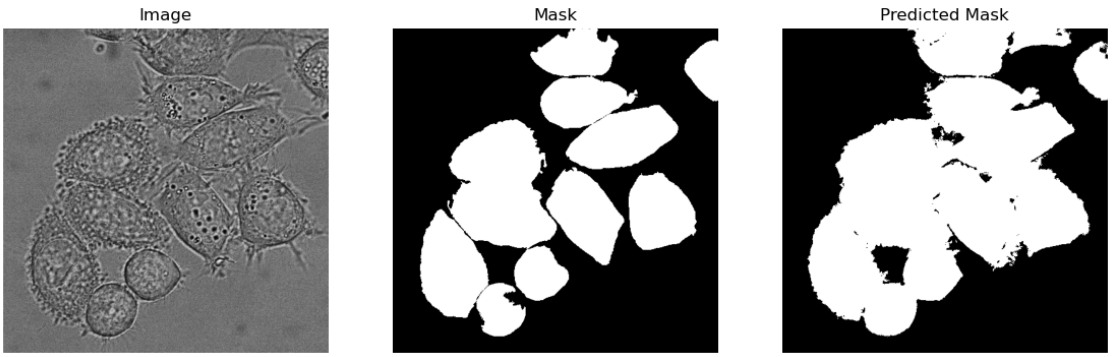
```
Epoch 153/280
21/21            28s 943ms/step -
loss: 0.2664 - acc: 0.8967 - val_loss: 0.2816 - val_acc: 0.8448 - lr: 0.0010

Epoch 154/280
21/21            27s 947ms/step -
loss: 0.2848 - acc: 0.8969 - val_loss: 0.3535 - val_acc: 0.8450 - lr: 0.0010

Epoch 155/280
21/21            28s 948ms/step -
loss: 0.3357 - acc: 0.8971 - val_loss: 0.2675 - val_acc: 0.8452 - lr: 0.0010

Epoch 156/280
21/21            29s 943ms/step -
loss: 0.2839 - acc: 0.8972 - val_loss: 0.2300 - val_acc: 0.8456 - lr: 0.0010

Epoch 157/280
21/21            27s 948ms/step -
loss: 0.3747 - acc: 0.8973 - val_loss: 0.2233 - val_acc: 0.8460 - lr: 0.0010

Epoch 158/280
21/21            28s 945ms/step -
loss: 0.2833 - acc: 0.8974 - val_loss: 0.2285 - val_acc: 0.8465 - lr: 0.0010

Epoch 159/280
21/21            28s 948ms/step -
loss: 0.2673 - acc: 0.8976 - val_loss: 0.2417 - val_acc: 0.8469 - lr: 0.0010

Epoch 160/280
21/21            28s 943ms/step -
loss: 0.1679 - acc: 0.8979 - val_loss: 0.2390 - val_acc: 0.8473 - lr: 0.0010

Epoch 161/280
21/21            28s 945ms/step -
loss: 0.4189 - acc: 0.8981 - val_loss: 0.2425 - val_acc: 0.8477 - lr: 0.0010

Epoch 162/280
21/21            28s 944ms/step -
loss: 0.1698 - acc: 0.8982 - val_loss: 0.2337 - val_acc: 0.8480 - lr: 0.0010

Epoch 163/280
21/21            28s 943ms/step -
loss: 0.2459 - acc: 0.8985 - val_loss: 0.2728 - val_acc: 0.8484 - lr: 0.0010

Epoch 164/280
21/21            28s 945ms/step -
loss: 0.3011 - acc: 0.8986 - val_loss: 0.2301 - val_acc: 0.8487 - lr: 0.0010
```

```
Epoch 165/280
21/21            28s 944ms/step -
loss: 0.3552 - acc: 0.8987 - val_loss: 0.2255 - val_acc: 0.8491 - lr: 0.0010

Epoch 166/280
21/21            28s 951ms/step -
loss: 0.1917 - acc: 0.8988 - val_loss: 0.2494 - val_acc: 0.8494 - lr: 0.0010

Epoch 167/280
21/21            28s 945ms/step -
loss: 0.2601 - acc: 0.8991 - val_loss: 0.2015 - val_acc: 0.8498 - lr: 0.0010

Epoch 168/280
21/21            28s 947ms/step -
loss: 0.3842 - acc: 0.8993 - val_loss: 0.2940 - val_acc: 0.8501 - lr: 0.0010

Epoch 169/280
21/21            28s 945ms/step -
loss: 0.3076 - acc: 0.8993 - val_loss: 0.2410 - val_acc: 0.8504 - lr: 0.0010

Epoch 170/280
21/21            29s 945ms/step -
loss: 0.3691 - acc: 0.8993 - val_loss: 0.3002 - val_acc: 0.8506 - lr: 0.0010

Epoch 171/280
21/21            29s 944ms/step -
loss: 0.3327 - acc: 0.8994 - val_loss: 0.2504 - val_acc: 0.8508 - lr: 0.0010

Epoch 172/280
21/21            28s 944ms/step -
loss: 0.3678 - acc: 0.8994 - val_loss: 0.2943 - val_acc: 0.8510 - lr: 0.0010

Epoch 173/280
21/21            29s 946ms/step -
loss: 0.3424 - acc: 0.8994 - val_loss: 0.2752 - val_acc: 0.8512 - lr: 0.0010

Epoch 174/280
21/21            28s 944ms/step -
loss: 0.3039 - acc: 0.8994 - val_loss: 0.2472 - val_acc: 0.8516 - lr: 0.0010

Epoch 175/280
21/21            29s 948ms/step -
loss: 0.3359 - acc: 0.8995 - val_loss: 0.2295 - val_acc: 0.8519 - lr: 0.0010

Epoch 176/280
21/21            28s 964ms/step -
loss: 0.2416 - acc: 0.8997 - val_loss: 0.2332 - val_acc: 0.8522 - lr: 0.0010
```

```
Epoch 177/280
21/21            28s 948ms/step -
loss: 0.2771 - acc: 0.8998 - val_loss: 0.2212 - val_acc: 0.8526 - lr: 0.0010

Epoch 178/280
21/21            28s 942ms/step -
loss: 0.2877 - acc: 0.9000 - val_loss: 0.3043 - val_acc: 0.8528 - lr: 0.0010

Epoch 179/280
21/21            29s 942ms/step -
loss: 0.2672 - acc: 0.9001 - val_loss: 0.2648 - val_acc: 0.8530 - lr: 0.0010

Epoch 180/280
21/21            29s 960ms/step -
loss: 0.2263 - acc: 0.9002 - val_loss: 0.2321 - val_acc: 0.8533 - lr: 0.0010

Epoch 181/280
21/21            29s 958ms/step -
loss: 0.3748 - acc: 0.9004 - val_loss: 0.2376 - val_acc: 0.8536 - lr: 0.0010

Epoch 182/280
21/21            28s 942ms/step -
loss: 0.3745 - acc: 0.9004 - val_loss: 0.2539 - val_acc: 0.8539 - lr: 0.0010

Epoch 183/280
21/21            28s 942ms/step -
loss: 0.2661 - acc: 0.9004 - val_loss: 0.2276 - val_acc: 0.8542 - lr: 0.0010

Epoch 184/280
21/21            28s 944ms/step -
loss: 0.3740 - acc: 0.9005 - val_loss: 0.2352 - val_acc: 0.8545 - lr: 0.0010

Epoch 185/280
21/21            28s 940ms/step -
loss: 0.3061 - acc: 0.9005 - val_loss: 0.2523 - val_acc: 0.8548 - lr: 0.0010

Epoch 186/280
21/21            28s 945ms/step -
loss: 0.2316 - acc: 0.9007 - val_loss: 0.2582 - val_acc: 0.8551 - lr: 0.0010

Epoch 187/280
21/21            28s 962ms/step -
loss: 0.2773 - acc: 0.9008 - val_loss: 0.2380 - val_acc: 0.8554 - lr: 0.0010

Epoch 188/280
21/21            28s 944ms/step -
loss: 0.3108 - acc: 0.9009 - val_loss: 0.2495 - val_acc: 0.8557 - lr: 0.0010
```

```
Epoch 189/280
21/21            47s 2s/step - loss:
0.2180 - acc: 0.9010 - val_loss: 0.2852 - val_acc: 0.8558 - lr: 0.0010

Epoch 190/280
21/21            28s 937ms/step -
loss: 0.2675 - acc: 0.9012 - val_loss: 0.2295 - val_acc: 0.8560 - lr: 0.0010

Epoch 191/280
21/21            28s 941ms/step -
loss: 0.3381 - acc: 0.9013 - val_loss: 0.2265 - val_acc: 0.8563 - lr: 0.0010

Epoch 192/280
21/21            28s 944ms/step -
loss: 0.2482 - acc: 0.9013 - val_loss: 0.2763 - val_acc: 0.8565 - lr: 0.0010

Epoch 193/280
21/21            28s 944ms/step -
loss: 0.1789 - acc: 0.9015 - val_loss: 0.2247 - val_acc: 0.8567 - lr: 0.0010

Epoch 194/280
21/21            28s 945ms/step -
loss: 0.2897 - acc: 0.9018 - val_loss: 0.2441 - val_acc: 0.8570 - lr: 0.0010

Epoch 195/280
21/21            28s 944ms/step -
loss: 0.2977 - acc: 0.9018 - val_loss: 0.3198 - val_acc: 0.8571 - lr: 0.0010

Epoch 196/280
21/21            28s 941ms/step -
loss: 0.1934 - acc: 0.9020 - val_loss: 0.2376 - val_acc: 0.8572 - lr: 0.0010

Epoch 197/280
21/21            28s 941ms/step -
loss: 0.2585 - acc: 0.9021 - val_loss: 0.2558 - val_acc: 0.8574 - lr: 0.0010

Epoch 198/280
21/21            28s 941ms/step -
loss: 0.1751 - acc: 0.9023 - val_loss: 0.2032 - val_acc: 0.8577 - lr: 0.0010

Epoch 199/280
21/21            28s 944ms/step -
loss: 0.3073 - acc: 0.9025 - val_loss: 0.2067 - val_acc: 0.8580 - lr: 0.0010

Epoch 200/280
21/21            28s 941ms/step -
loss: 0.3979 - acc: 0.9025 - val_loss: 0.2690 - val_acc: 0.8582 - lr: 0.0010
```

```
Epoch 201/280
21/21             28s 945ms/step -
loss: 0.2302 - acc: 0.9025 - val_loss: 0.2534 - val_acc: 0.8584 - lr: 0.0010

Epoch 202/280
21/21             29s 962ms/step -
loss: 0.2996 - acc: 0.9027 - val_loss: 0.2261 - val_acc: 0.8587 - lr: 0.0010

Epoch 203/280
21/21             28s 945ms/step -
loss: 0.3654 - acc: 0.9028 - val_loss: 0.3844 - val_acc: 0.8586 - lr: 0.0010

Epoch 204/280
21/21             28s 940ms/step -
loss: 0.2861 - acc: 0.9028 - val_loss: 0.3338 - val_acc: 0.8586 - lr: 0.0010

Epoch 205/280
21/21             28s 943ms/step -
loss: 0.3717 - acc: 0.9028 - val_loss: 0.2591 - val_acc: 0.8587 - lr: 0.0010

Epoch 206/280
21/21             28s 938ms/step -
loss: 0.2231 - acc: 0.9028 - val_loss: 0.2662 - val_acc: 0.8589 - lr: 0.0010

Epoch 207/280
21/21             28s 939ms/step -
loss: 0.3171 - acc: 0.9030 - val_loss: 0.2207 - val_acc: 0.8591 - lr: 0.0010

Epoch 208/280
21/21             28s 939ms/step -
loss: 0.3766 - acc: 0.9030 - val_loss: 0.2515 - val_acc: 0.8593 - lr: 0.0010

Epoch 209/280
21/21             28s 941ms/step -
loss: 0.3402 - acc: 0.9029 - val_loss: 0.2238 - val_acc: 0.8596 - lr: 0.0010

Epoch 210/280
21/21             28s 948ms/step -
loss: 0.3005 - acc: 0.9029 - val_loss: 0.2727 - val_acc: 0.8598 - lr: 0.0010
```




```
Epoch 211/280
21/21            28s 941ms/step -
loss: 0.3388 - acc: 0.9030 - val_loss: 0.2495 - val_acc: 0.8600 - lr: 0.0010

Epoch 212/280
21/21            28s 948ms/step -
loss: 0.2946 - acc: 0.9030 - val_loss: 0.2284 - val_acc: 0.8602 - lr: 0.0010

Epoch 213/280
21/21            28s 942ms/step -
loss: 0.2961 - acc: 0.9031 - val_loss: 0.2838 - val_acc: 0.8604 - lr: 0.0010

Epoch 214/280
21/21            28s 945ms/step -
loss: 0.2742 - acc: 0.9031 - val_loss: 0.2162 - val_acc: 0.8606 - lr: 0.0010

Epoch 215/280
21/21            28s 942ms/step -
loss: 0.2583 - acc: 0.9032 - val_loss: 0.2302 - val_acc: 0.8609 - lr: 0.0010

Epoch 216/280
21/21            28s 946ms/step -
loss: 0.1695 - acc: 0.9034 - val_loss: 0.2128 - val_acc: 0.8611 - lr: 0.0010

Epoch 217/280
21/21            28s 942ms/step -
loss: 0.1795 - acc: 0.9036 - val_loss: 0.2115 - val_acc: 0.8614 - lr: 0.0010

Epoch 218/280
21/21            28s 941ms/step -
loss: 0.1521 - acc: 0.9038 - val_loss: 0.2090 - val_acc: 0.8616 - lr: 0.0010

Epoch 219/280
```

```
21/21            28s 948ms/step -
loss: 0.1473 - acc: 0.9041 - val_loss: 0.2003 - val_acc: 0.8619 - lr: 0.0010

Epoch 220/280
21/21            28s 942ms/step -
loss: 0.3509 - acc: 0.9043 - val_loss: 0.2086 - val_acc: 0.8622 - lr: 0.0010

Epoch 221/280
21/21            28s 945ms/step -
loss: 0.3168 - acc: 0.9044 - val_loss: 0.1995 - val_acc: 0.8624 - lr: 0.0010

Epoch 222/280
21/21            28s 941ms/step -
loss: 0.4634 - acc: 0.9044 - val_loss: 0.2126 - val_acc: 0.8627 - lr: 0.0010

Epoch 223/280
21/21            27s 943ms/step -
loss: 0.2888 - acc: 0.9044 - val_loss: 0.2397 - val_acc: 0.8629 - lr: 0.0010

Epoch 224/280
21/21            28s 941ms/step -
loss: 0.2761 - acc: 0.9045 - val_loss: 0.2638 - val_acc: 0.8631 - lr: 0.0010

Epoch 225/280
21/21            28s 936ms/step -
loss: 0.2791 - acc: 0.9045 - val_loss: 0.2618 - val_acc: 0.8633 - lr: 0.0010

Epoch 226/280
21/21            28s 941ms/step -
loss: 0.1880 - acc: 0.9047 - val_loss: 0.2647 - val_acc: 0.8635 - lr: 0.0010

Epoch 227/280
21/21            28s 940ms/step -
loss: 0.2505 - acc: 0.9049 - val_loss: 0.2675 - val_acc: 0.8636 - lr: 0.0010

Epoch 228/280
21/21            28s 942ms/step -
loss: 0.2842 - acc: 0.9050 - val_loss: 0.2746 - val_acc: 0.8638 - lr: 0.0010

Epoch 229/280
21/21            28s 942ms/step -
loss: 0.1577 - acc: 0.9051 - val_loss: 0.2470 - val_acc: 0.8639 - lr: 0.0010

Epoch 230/280
21/21            28s 943ms/step -
loss: 0.3463 - acc: 0.9053 - val_loss: 0.2259 - val_acc: 0.8641 - lr: 0.0010

Epoch 231/280
```

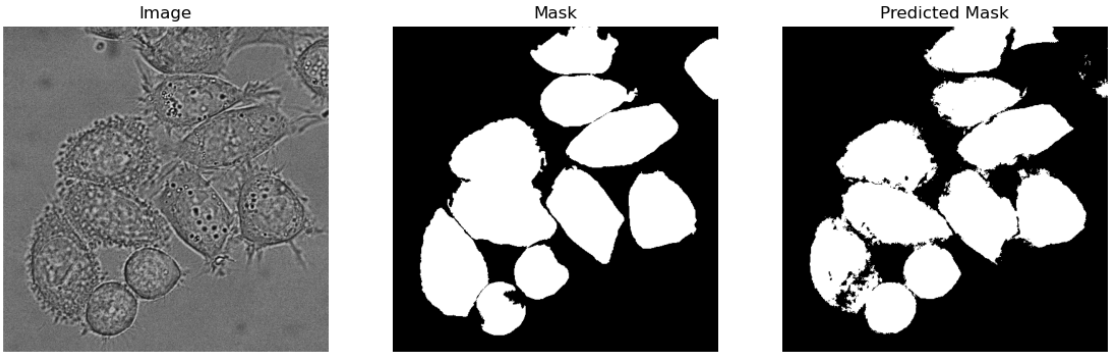
```
21/21            29s 959ms/step -
loss: 0.3064 - acc: 0.9053 - val_loss: 0.2499 - val_acc: 0.8642 - lr: 0.0010

Epoch 232/280
21/21            29s 932ms/step -
loss: 0.2916 - acc: 0.9054 - val_loss: 0.2400 - val_acc: 0.8644 - lr: 0.0010

Epoch 233/280
21/21            27s 942ms/step -
loss: 0.3049 - acc: 0.9054 - val_loss: 0.2745 - val_acc: 0.8646 - lr: 0.0010

Epoch 234/280
21/21            28s 940ms/step -
loss: 0.2760 - acc: 0.9055 - val_loss: 0.2371 - val_acc: 0.8647 - lr: 0.0010

Epoch 235/280
21/21            28s 960ms/step -
loss: 0.1735 - acc: 0.9056 - val_loss: 0.2325 - val_acc: 0.8649 - lr: 0.0010

Epoch 236/280
21/21            28s 938ms/step -
loss: 0.2563 - acc: 0.9058 - val_loss: 0.2271 - val_acc: 0.8652 - lr: 0.0010

Epoch 237/280
21/21            28s 945ms/step -
loss: 0.1856 - acc: 0.9059 - val_loss: 0.2258 - val_acc: 0.8654 - lr: 0.0010

Epoch 238/280
21/21            28s 944ms/step -
loss: 0.2143 - acc: 0.9061 - val_loss: 0.2231 - val_acc: 0.8656 - lr: 0.0010

Epoch 239/280
21/21            27s 946ms/step -
loss: 0.2988 - acc: 0.9062 - val_loss: 0.2341 - val_acc: 0.8657 - lr: 0.0010

Epoch 240/280
21/21            28s 917ms/step -
loss: 0.2097 - acc: 0.9063 - val_loss: 0.2506 - val_acc: 0.8659 - lr: 0.0010

Epoch 241/280
21/21            28s 945ms/step -
loss: 0.1506 - acc: 0.9065 - val_loss: 0.2435 - val_acc: 0.8661 - lr: 0.0010

Epoch 242/280
21/21            28s 943ms/step -
loss: 0.2241 - acc: 0.9067 - val_loss: 0.2174 - val_acc: 0.8663 - lr: 0.0010

Epoch 243/280
```

```
21/21            28s 944ms/step -
loss: 0.1670 - acc: 0.9068 - val_loss: 0.1945 - val_acc: 0.8665 - lr: 0.0010

Epoch 244/280
21/21            28s 940ms/step -
loss: 0.1417 - acc: 0.9070 - val_loss: 0.1864 - val_acc: 0.8667 - lr: 0.0010

Epoch 245/280
21/21            28s 942ms/step -
loss: 0.1946 - acc: 0.9072 - val_loss: 0.1924 - val_acc: 0.8670 - lr: 0.0010

Epoch 246/280
21/21            28s 942ms/step -
loss: 0.2946 - acc: 0.9073 - val_loss: 0.2001 - val_acc: 0.8672 - lr: 0.0010

Epoch 247/280
21/21            28s 940ms/step -
loss: 0.1607 - acc: 0.9074 - val_loss: 0.2138 - val_acc: 0.8674 - lr: 0.0010

Epoch 248/280
21/21            28s 947ms/step -
loss: 0.2845 - acc: 0.9076 - val_loss: 0.2125 - val_acc: 0.8676 - lr: 0.0010

Epoch 249/280
21/21            28s 940ms/step -
loss: 0.1629 - acc: 0.9077 - val_loss: 0.2257 - val_acc: 0.8678 - lr: 0.0010

Epoch 250/280
21/21            28s 946ms/step -
loss: 0.2899 - acc: 0.9078 - val_loss: 0.2193 - val_acc: 0.8680 - lr: 0.0010

Epoch 251/280
21/21            28s 941ms/step -
loss: 0.2740 - acc: 0.9079 - val_loss: 0.2265 - val_acc: 0.8681 - lr: 0.0010

Epoch 252/280
21/21            28s 944ms/step -
loss: 0.3162 - acc: 0.9079 - val_loss: 0.2155 - val_acc: 0.8683 - lr: 0.0010

Epoch 253/280
21/21            28s 943ms/step -
loss: 0.1716 - acc: 0.9080 - val_loss: 0.2175 - val_acc: 0.8685 - lr: 0.0010

Epoch 254/280
21/21            28s 940ms/step -
loss: 0.2599 - acc: 0.9082 - val_loss: 0.2042 - val_acc: 0.8687 - lr: 0.0010

Epoch 255/280
```

```
21/21            28s 943ms/step -
loss: 0.2803 - acc: 0.9083 - val_loss: 0.2117 - val_acc: 0.8689 - lr: 0.0010

Epoch 256/280
21/21            28s 921ms/step -
loss: 0.1640 - acc: 0.9084 - val_loss: 0.2394 - val_acc: 0.8691 - lr: 0.0010

Epoch 257/280
21/21            28s 965ms/step -
loss: 0.1622 - acc: 0.9085 - val_loss: 0.2025 - val_acc: 0.8693 - lr: 0.0010

Epoch 258/280
21/21            28s 944ms/step -
loss: 0.1461 - acc: 0.9087 - val_loss: 0.4955 - val_acc: 0.8691 - lr: 0.0010

Epoch 259/280
21/21            28s 944ms/step -
loss: 0.1494 - acc: 0.9089 - val_loss: 0.2908 - val_acc: 0.8690 - lr: 0.0010

Epoch 260/280
21/21            28s 922ms/step -
loss: 0.3969 - acc: 0.9091 - val_loss: 0.2089 - val_acc: 0.8692 - lr: 0.0010

Epoch 261/280
21/21            28s 943ms/step -
loss: 0.2065 - acc: 0.9091 - val_loss: 0.2623 - val_acc: 0.8693 - lr: 0.0010

Epoch 262/280
21/21            28s 937ms/step -
loss: 0.3990 - acc: 0.9092 - val_loss: 0.2446 - val_acc: 0.8694 - lr: 0.0010

Epoch 263/280
21/21            28s 941ms/step -
loss: 0.3022 - acc: 0.9091 - val_loss: 0.2577 - val_acc: 0.8695 - lr: 0.0010

Epoch 264/280
21/21            28s 944ms/step -
loss: 0.2994 - acc: 0.9092 - val_loss: 0.2524 - val_acc: 0.8696 - lr: 0.0010

Epoch 265/280
21/21            28s 929ms/step -
loss: 0.3257 - acc: 0.9092 - val_loss: 0.2550 - val_acc: 0.8698 - lr: 0.0010

Epoch 266/280
21/21            28s 947ms/step -
loss: 0.3066 - acc: 0.9092 - val_loss: 0.2744 - val_acc: 0.8699 - lr: 0.0010

Epoch 267/280
```

```
21/21            28s 939ms/step -
loss: 0.2026 - acc: 0.9093 - val_loss: 0.2622 - val_acc: 0.8700 - lr: 0.0010

Epoch 268/280
21/21            28s 946ms/step -
loss: 0.1788 - acc: 0.9094 - val_loss: 0.2589 - val_acc: 0.8701 - lr: 0.0010

Epoch 269/280
21/21            28s 941ms/step -
loss: 0.3779 - acc: 0.9096 - val_loss: 0.2933 - val_acc: 0.8702 - lr: 0.0010

Epoch 270/280
21/21            28s 942ms/step -
loss: 0.2023 - acc: 0.9096 - val_loss: 0.2362 - val_acc: 0.8703 - lr: 0.0010

Epoch 271/280
21/21            28s 942ms/step -
loss: 0.1569 - acc: 0.9097 - val_loss: 0.2380 - val_acc: 0.8704 - lr: 0.0010

Epoch 272/280
21/21            28s 942ms/step -
loss: 0.4173 - acc: 0.9098 - val_loss: 0.2264 - val_acc: 0.8706 - lr: 0.0010

Epoch 273/280
21/21            29s 940ms/step -
loss: 0.2939 - acc: 0.9098 - val_loss: 0.2680 - val_acc: 0.8707 - lr: 0.0010

Epoch 274/280
21/21            28s 941ms/step -
loss: 0.2084 - acc: 0.9099 - val_loss: 0.2238 - val_acc: 0.8708 - lr: 0.0010

Epoch 275/280
21/21            28s 945ms/step -
loss: 0.2655 - acc: 0.9100 - val_loss: 0.2192 - val_acc: 0.8710 - lr: 0.0010

Epoch 276/280
21/21            28s 940ms/step -
loss: 0.3063 - acc: 0.9100 - val_loss: 0.2329 - val_acc: 0.8711 - lr: 0.0010

Epoch 277/280
21/21            28s 947ms/step -
loss: 0.1695 - acc: 0.9101 - val_loss: 0.2079 - val_acc: 0.8713 - lr: 0.0010

Epoch 278/280
21/21            28s 943ms/step -
loss: 0.3099 - acc: 0.9102 - val_loss: 0.2323 - val_acc: 0.8714 - lr: 0.0010

Epoch 279/280
```

```
21/21              28s 945ms/step -
loss: 0.2395 - acc: 0.9102 - val_loss: 0.2158 - val_acc: 0.8716 - lr: 0.0010

Epoch 280/280
21/21              28s 941ms/step -
loss: 0.2664 - acc: 0.9103 - val_loss: 0.2195 - val_acc: 0.8717 - lr: 0.0010
```




```
W0000 00:00:1739737443.209688 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.

6/6              4s 488ms/step
```

[ ]:
```
print("Average out-of-fold IoU: {:.6f}".format(np.mean(oof_IoU)))
print("Average out-of-fold dice loss: {:.6f}".format(np.mean(oof_dice)))
```

```
Average out-of-fold IoU: 0.844340
Average out-of-fold dice loss: 0.141248
```

5.2 Training with the entire dataset

Same as before, but this time for the entire training dataset

[ ]:
```
try:
    del helper
except:
    pass

reset_seed()
K.clear_session()

train_ds = hela_train["01"].concatenate(hela_train["02"])
training_size = train_ds.cardinality()
train_ds = train_ds.shuffle(training_size, reshuffle_each_iteration=True)\
                   .repeat(2 * np.lcm(batch_size, training_size) //␣
 ↪(training_size))\
```

```
                    .batch(batch_size, drop_remainder=False,␣
 ↪num_parallel_calls=tf.data.AUTOTUNE)\
                    .map(pipeline, num_parallel_calls=tf.data.AUTOTUNE)\
                    .prefetch(tf.data.AUTOTUNE)
dist_train = strategy.experimental_distribute_dataset(train_ds)

gc.collect()
with strategy.scope():
    gc.collect()
    helper = UNetHelper(strategy=strategy,
                        model_param=model_param,
                        loss_func=tf.keras.losses.
 ↪sparse_categorical_crossentropy,
                        optimizer=tf.keras.optimizers.SGD(learning_rate=max_lr,␣
 ↪momentum=0.99),
                        #opt_schedule=tf.keras.optimizers.schedules.
 ↪PiecewiseConstantDecay(boundaries=[5,], values=[1e-2, 1e-3]),
                        )
    if train_model:
        train(helper, dist_train, None, None, max_epochs, ckpt_every=60,␣
 ↪plot_every=None, verbose=True)
        helper.model.save(f"{tf_dir}/models/model_all.keras")
    else:
        helper.model.load(f"{tf_dir}/models/model_all.keras")
```

```
W0000 00:00:1739737448.245434 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.
W0000 00:00:1739737448.245584 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.


Epoch 1/280

E0000 00:00:1739737468.748896 1711261 meta_optimizer.cc:966] layout failed:
INVALID_ARGUMENT: Size of values 0 does not match size of permutation 4 @ fanin
shape inStatefulPartitionedCall/sequential_1/u_net_1/spatial_dropout2d_1/statele
ss_dropout/SelectV2-2-TransposeNHWCToNCHW-LayoutOptimizer

42/42            53s 820ms/step -
loss: 0.9820 - acc: 0.5261 - lr: 0.0010

Epoch 2/280
42/42            47s 814ms/step -
loss: 0.7313 - acc: 0.6181 - lr: 0.0010

Epoch 3/280
```

```
42/42            46s 812ms/step -
loss: 0.6418 - acc: 0.6639 - lr: 0.0010

Epoch 4/280
42/42            46s 812ms/step -
loss: 0.5765 - acc: 0.6920 - lr: 0.0010

Epoch 5/280
42/42            47s 815ms/step -
loss: 0.4942 - acc: 0.7162 - lr: 0.0010

Epoch 6/280
42/42            46s 813ms/step -
loss: 0.5281 - acc: 0.7344 - lr: 0.0010

Epoch 7/280
42/42            47s 814ms/step -
loss: 0.4671 - acc: 0.7466 - lr: 0.0010

Epoch 8/280
42/42            47s 813ms/step -
loss: 0.4487 - acc: 0.7581 - lr: 0.0010

Epoch 9/280
42/42            46s 815ms/step -
loss: 0.4861 - acc: 0.7674 - lr: 0.0010

Epoch 10/280
42/42            47s 815ms/step -
loss: 0.4462 - acc: 0.7739 - lr: 0.0010

Epoch 11/280
42/42            47s 801ms/step -
loss: 0.3941 - acc: 0.7811 - lr: 0.0010

Epoch 12/280
42/42            46s 814ms/step -
loss: 0.4805 - acc: 0.7881 - lr: 0.0010

Epoch 13/280
42/42            46s 816ms/step -
loss: 0.4201 - acc: 0.7928 - lr: 0.0010

Epoch 14/280
42/42            46s 816ms/step -
loss: 0.4367 - acc: 0.7978 - lr: 0.0010

Epoch 15/280
```

```
42/42            46s 815ms/step -
loss: 0.4341 - acc: 0.8019 - lr: 0.0010

Epoch 16/280
42/42            46s 814ms/step -
loss: 0.3807 - acc: 0.8060 - lr: 0.0010

Epoch 17/280
42/42            46s 808ms/step -
loss: 0.3165 - acc: 0.8108 - lr: 0.0010

Epoch 18/280
42/42            47s 814ms/step -
loss: 0.2994 - acc: 0.8160 - lr: 0.0010

Epoch 19/280
42/42            47s 813ms/step -
loss: 0.2922 - acc: 0.8208 - lr: 0.0010

Epoch 20/280
42/42            47s 816ms/step -
loss: 0.3338 - acc: 0.8253 - lr: 0.0010

Epoch 21/280
42/42            47s 815ms/step -
loss: 0.3140 - acc: 0.8288 - lr: 0.0010

Epoch 22/280
42/42            46s 813ms/step -
loss: 0.3421 - acc: 0.8323 - lr: 0.0010

Epoch 23/280
42/42            47s 812ms/step -
loss: 0.3893 - acc: 0.8350 - lr: 0.0010

Epoch 24/280
42/42            47s 814ms/step -
loss: 0.3130 - acc: 0.8371 - lr: 0.0010

Epoch 25/280
42/42            86s 2s/step - loss:
0.4174 - acc: 0.8399 - lr: 0.0010

Epoch 26/280
42/42            46s 806ms/step -
loss: 0.2720 - acc: 0.8417 - lr: 0.0010

Epoch 27/280
```

```
42/42            47s 813ms/step -
loss: 0.2911 - acc: 0.8445 - lr: 0.0010

Epoch 28/280
42/42            46s 810ms/step -
loss: 0.3759 - acc: 0.8468 - lr: 0.0010

Epoch 29/280
42/42            46s 812ms/step -
loss: 0.2884 - acc: 0.8486 - lr: 0.0010

Epoch 30/280
42/42            45s 815ms/step -
loss: 0.2449 - acc: 0.8510 - lr: 0.0010

Epoch 31/280
42/42            46s 804ms/step -
loss: 0.3573 - acc: 0.8534 - lr: 0.0010

Epoch 32/280
42/42            47s 813ms/step -
loss: 0.2785 - acc: 0.8550 - lr: 0.0010

Epoch 33/280
42/42            47s 811ms/step -
loss: 0.3219 - acc: 0.8570 - lr: 0.0010

Epoch 34/280
42/42            46s 814ms/step -
loss: 0.3512 - acc: 0.8587 - lr: 0.0010

Epoch 35/280
42/42            47s 814ms/step -
loss: 0.2996 - acc: 0.8598 - lr: 0.0010

Epoch 36/280
42/42            46s 803ms/step -
loss: 0.3304 - acc: 0.8614 - lr: 0.0010

Epoch 37/280
42/42            47s 811ms/step -
loss: 0.3146 - acc: 0.8625 - lr: 0.0010

Epoch 38/280
42/42            47s 814ms/step -
loss: 0.2281 - acc: 0.8639 - lr: 0.0010

Epoch 39/280
```

```
42/42            47s 815ms/step -
loss: 0.2509 - acc: 0.8657 - lr: 0.0010

Epoch 40/280
42/42            46s 811ms/step -
loss: 0.2973 - acc: 0.8673 - lr: 0.0010

Epoch 41/280
42/42            47s 813ms/step -
loss: 0.2752 - acc: 0.8687 - lr: 0.0010

Epoch 42/280
42/42            86s 2s/step - loss:
0.2086 - acc: 0.8700 - lr: 0.0010

Epoch 43/280
42/42            46s 805ms/step -
loss: 0.2533 - acc: 0.8715 - lr: 0.0010

Epoch 44/280
42/42            47s 813ms/step -
loss: 0.2040 - acc: 0.8728 - lr: 0.0010

Epoch 45/280
42/42            47s 813ms/step -
loss: 0.4320 - acc: 0.8741 - lr: 0.0010

Epoch 46/280
42/42            47s 810ms/step -
loss: 0.2428 - acc: 0.8746 - lr: 0.0010

Epoch 47/280
42/42            47s 812ms/step -
loss: 0.3089 - acc: 0.8758 - lr: 0.0010

Epoch 48/280
42/42            47s 814ms/step -
loss: 0.2535 - acc: 0.8766 - lr: 0.0010

Epoch 49/280
42/42            47s 815ms/step -
loss: 0.2128 - acc: 0.8778 - lr: 0.0010

Epoch 50/280
42/42            47s 813ms/step -
loss: 0.1993 - acc: 0.8790 - lr: 0.0010

Epoch 51/280
```

```
42/42            47s 811ms/step -
loss: 0.2952 - acc: 0.8802 - lr: 0.0010

Epoch 52/280
42/42            47s 814ms/step -
loss: 0.1935 - acc: 0.8810 - lr: 0.0010

Epoch 53/280
42/42            47s 815ms/step -
loss: 0.2409 - acc: 0.8821 - lr: 0.0010

Epoch 54/280
42/42            47s 812ms/step -
loss: 0.2378 - acc: 0.8831 - lr: 0.0010

Epoch 55/280
42/42            47s 812ms/step -
loss: 0.2476 - acc: 0.8840 - lr: 0.0010

Epoch 56/280
42/42            47s 814ms/step -
loss: 0.1921 - acc: 0.8848 - lr: 0.0010

Epoch 57/280
42/42            46s 815ms/step -
loss: 0.2861 - acc: 0.8858 - lr: 0.0010

Epoch 58/280
42/42            44s 812ms/step -
loss: 0.3179 - acc: 0.8865 - lr: 0.0010

Epoch 59/280
42/42            45s 817ms/step -
loss: 0.2185 - acc: 0.8870 - lr: 0.0010

Epoch 60/280
42/42            45s 820ms/step -
loss: 0.2240 - acc: 0.8879 - lr: 0.0010

Epoch 61/280
42/42            45s 817ms/step -
loss: 0.3232 - acc: 0.8887 - lr: 0.0010

Epoch 62/280
42/42            46s 814ms/step -
loss: 0.2317 - acc: 0.8892 - lr: 0.0010

Epoch 63/280
```

```
42/42            45s 817ms/step -
loss: 0.2777 - acc: 0.8898 - lr: 0.0010

Epoch 64/280
42/42            46s 812ms/step -
loss: 0.3003 - acc: 0.8903 - lr: 0.0010

Epoch 65/280
42/42            46s 815ms/step -
loss: 0.2944 - acc: 0.8908 - lr: 0.0010

Epoch 66/280
42/42            46s 813ms/step -
loss: 0.2310 - acc: 0.8912 - lr: 0.0010

Epoch 67/280
42/42            46s 819ms/step -
loss: 0.2821 - acc: 0.8919 - lr: 0.0010

Epoch 68/280
42/42            46s 817ms/step -
loss: 0.3396 - acc: 0.8925 - lr: 0.0010

Epoch 69/280
42/42            46s 811ms/step -
loss: 0.2402 - acc: 0.8928 - lr: 0.0010

Epoch 70/280
42/42            46s 816ms/step -
loss: 0.2151 - acc: 0.8934 - lr: 0.0010

Epoch 71/280
42/42            47s 808ms/step -
loss: 0.2565 - acc: 0.8940 - lr: 0.0010

Epoch 72/280
42/42            46s 817ms/step -
loss: 0.2087 - acc: 0.8946 - lr: 0.0010

Epoch 73/280
42/42            46s 813ms/step -
loss: 0.1776 - acc: 0.8952 - lr: 0.0010

Epoch 74/280
42/42            47s 815ms/step -
loss: 0.1714 - acc: 0.8959 - lr: 0.0010

Epoch 75/280
```

```
42/42            47s 818ms/step -
loss: 0.2652 - acc: 0.8966 - lr: 0.0010

Epoch 76/280
42/42            46s 816ms/step -
loss: 0.3838 - acc: 0.8970 - lr: 0.0010

Epoch 77/280
42/42            47s 815ms/step -
loss: 0.2261 - acc: 0.8971 - lr: 0.0010

Epoch 78/280
42/42            46s 816ms/step -
loss: 0.2718 - acc: 0.8976 - lr: 0.0010

Epoch 79/280
42/42            47s 816ms/step -
loss: 0.2717 - acc: 0.8981 - lr: 0.0010

Epoch 80/280
42/42            46s 813ms/step -
loss: 0.2794 - acc: 0.8985 - lr: 0.0010

Epoch 81/280
42/42            47s 816ms/step -
loss: 0.2847 - acc: 0.8987 - lr: 0.0010

Epoch 82/280
42/42            49s 838ms/step -
loss: 0.3186 - acc: 0.8991 - lr: 0.0010

Epoch 83/280
42/42            48s 910ms/step -
loss: 0.2970 - acc: 0.8992 - lr: 0.0010

Epoch 84/280
42/42            46s 816ms/step -
loss: 0.2004 - acc: 0.8995 - lr: 0.0010

Epoch 85/280
42/42            45s 816ms/step -
loss: 0.2415 - acc: 0.9001 - lr: 0.0010

Epoch 86/280
42/42            47s 816ms/step -
loss: 0.3021 - acc: 0.9005 - lr: 0.0010

Epoch 87/280
```

```
42/42            46s 816ms/step -
loss: 0.3043 - acc: 0.9008 - lr: 0.0010

Epoch 88/280
42/42            47s 818ms/step -
loss: 0.2655 - acc: 0.9010 - lr: 0.0010

Epoch 89/280
42/42            46s 815ms/step -
loss: 0.2760 - acc: 0.9013 - lr: 0.0010

Epoch 90/280
42/42            45s 815ms/step -
loss: 0.2348 - acc: 0.9016 - lr: 0.0010

Epoch 91/280
42/42            46s 816ms/step -
loss: 0.2344 - acc: 0.9020 - lr: 0.0010

Epoch 92/280
42/42            46s 818ms/step -
loss: 0.2227 - acc: 0.9023 - lr: 0.0010

Epoch 93/280
42/42            47s 816ms/step -
loss: 0.2427 - acc: 0.9027 - lr: 0.0010

Epoch 94/280
42/42            46s 816ms/step -
loss: 0.2935 - acc: 0.9030 - lr: 0.0010

Epoch 95/280
42/42            46s 816ms/step -
loss: 0.2484 - acc: 0.9032 - lr: 0.0010

Epoch 96/280
42/42            45s 818ms/step -
loss: 0.2372 - acc: 0.9036 - lr: 0.0010

Epoch 97/280
42/42            47s 814ms/step -
loss: 0.2440 - acc: 0.9038 - lr: 0.0010

Epoch 98/280
42/42            46s 816ms/step -
loss: 0.3081 - acc: 0.9041 - lr: 0.0010

Epoch 99/280
```

```
42/42            47s 816ms/step -
loss: 0.2318 - acc: 0.9043 - lr: 0.0010

Epoch 100/280
42/42            46s 818ms/step -
loss: 0.3511 - acc: 0.9046 - lr: 0.0010

Epoch 101/280
42/42            47s 815ms/step -
loss: 0.1874 - acc: 0.9047 - lr: 0.0010

Epoch 102/280
42/42            47s 814ms/step -
loss: 0.3235 - acc: 0.9050 - lr: 0.0010

Epoch 103/280
42/42            47s 815ms/step -
loss: 0.2568 - acc: 0.9052 - lr: 0.0010

Epoch 104/280
42/42            46s 815ms/step -
loss: 0.3098 - acc: 0.9054 - lr: 0.0010

Epoch 105/280
42/42            47s 816ms/step -
loss: 0.3203 - acc: 0.9054 - lr: 0.0010

Epoch 106/280
42/42            47s 815ms/step -
loss: 0.2248 - acc: 0.9055 - lr: 0.0010

Epoch 107/280
42/42            47s 816ms/step -
loss: 0.2518 - acc: 0.9058 - lr: 0.0010

Epoch 108/280
42/42            47s 816ms/step -
loss: 0.2701 - acc: 0.9061 - lr: 0.0010

Epoch 109/280
42/42            46s 815ms/step -
loss: 0.2271 - acc: 0.9063 - lr: 0.0010

Epoch 110/280
42/42            46s 817ms/step -
loss: 0.3197 - acc: 0.9066 - lr: 0.0010

Epoch 111/280
```

```
42/42            46s 817ms/step -
loss: 0.1873 - acc: 0.9067 - lr: 0.0010

Epoch 112/280
42/42            47s 814ms/step -
loss: 0.2300 - acc: 0.9070 - lr: 0.0010

Epoch 113/280
42/42            46s 817ms/step -
loss: 0.1699 - acc: 0.9074 - lr: 0.0010

Epoch 114/280
42/42            47s 814ms/step -
loss: 0.1578 - acc: 0.9078 - lr: 0.0010

Epoch 115/280
42/42            47s 819ms/step -
loss: 0.3558 - acc: 0.9081 - lr: 0.0010

Epoch 116/280
42/42            46s 813ms/step -
loss: 0.2296 - acc: 0.9083 - lr: 0.0010

Epoch 117/280
42/42            46s 815ms/step -
loss: 0.1833 - acc: 0.9085 - lr: 0.0010

Epoch 118/280
42/42            46s 816ms/step -
loss: 0.3436 - acc: 0.9088 - lr: 0.0010

Epoch 119/280
42/42            46s 815ms/step -
loss: 0.2563 - acc: 0.9089 - lr: 0.0010

Epoch 120/280
42/42            47s 815ms/step -
loss: 0.1853 - acc: 0.9091 - lr: 0.0010

Epoch 121/280
42/42            47s 813ms/step -
loss: 0.2450 - acc: 0.9094 - lr: 0.0010

Epoch 122/280
42/42            46s 816ms/step -
loss: 0.2111 - acc: 0.9096 - lr: 0.0010

Epoch 123/280
```

```
42/42            46s 811ms/step -
loss: 0.2639 - acc: 0.9099 - lr: 0.0010

Epoch 124/280
42/42            46s 811ms/step -
loss: 0.3173 - acc: 0.9100 - lr: 0.0010

Epoch 125/280
42/42            46s 814ms/step -
loss: 0.1965 - acc: 0.9102 - lr: 0.0010

Epoch 126/280
42/42            46s 814ms/step -
loss: 0.2190 - acc: 0.9104 - lr: 0.0010

Epoch 127/280
42/42            44s 808ms/step -
loss: 0.2604 - acc: 0.9107 - lr: 0.0010

Epoch 128/280
42/42            46s 812ms/step -
loss: 0.2217 - acc: 0.9108 - lr: 0.0010

Epoch 129/280
42/42            45s 814ms/step -
loss: 0.2022 - acc: 0.9111 - lr: 0.0010

Epoch 130/280
42/42            46s 813ms/step -
loss: 0.2417 - acc: 0.9113 - lr: 0.0010

Epoch 131/280
42/42            46s 814ms/step -
loss: 0.2326 - acc: 0.9115 - lr: 0.0010

Epoch 132/280
42/42            46s 813ms/step -
loss: 0.2318 - acc: 0.9117 - lr: 0.0010

Epoch 133/280
42/42            46s 812ms/step -
loss: 0.1572 - acc: 0.9119 - lr: 0.0010

Epoch 134/280
42/42            46s 803ms/step -
loss: 0.1979 - acc: 0.9123 - lr: 0.0010

Epoch 135/280
```

```
42/42            45s 814ms/step -
loss: 0.1997 - acc: 0.9125 - lr: 0.0010

Epoch 136/280
42/42            47s 811ms/step -
loss: 0.1979 - acc: 0.9127 - lr: 0.0010

Epoch 137/280
42/42            45s 815ms/step -
loss: 0.2128 - acc: 0.9130 - lr: 0.0010

Epoch 138/280
42/42            46s 814ms/step -
loss: 0.2434 - acc: 0.9132 - lr: 0.0010

Epoch 139/280
42/42            47s 808ms/step -
loss: 0.2849 - acc: 0.9133 - lr: 0.0010

Epoch 140/280
42/42            47s 814ms/step -
loss: 0.1772 - acc: 0.9134 - lr: 0.0010

Epoch 141/280
42/42            47s 815ms/step -
loss: 0.2973 - acc: 0.9136 - lr: 0.0010

Epoch 142/280
42/42            47s 813ms/step -
loss: 0.2143 - acc: 0.9137 - lr: 0.0010

Epoch 143/280
42/42            47s 811ms/step -
loss: 0.2521 - acc: 0.9139 - lr: 0.0010

Epoch 144/280
42/42            46s 816ms/step -
loss: 0.2760 - acc: 0.9140 - lr: 0.0010

Epoch 145/280
42/42            46s 815ms/step -
loss: 0.2723 - acc: 0.9141 - lr: 0.0010

Epoch 146/280
42/42            46s 812ms/step -
loss: 0.2178 - acc: 0.9143 - lr: 0.0010

Epoch 147/280
```

```
42/42            45s 812ms/step -
loss: 0.2193 - acc: 0.9144 - lr: 0.0010

Epoch 148/280
42/42            46s 814ms/step -
loss: 0.2395 - acc: 0.9146 - lr: 0.0010

Epoch 149/280
42/42            46s 819ms/step -
loss: 0.1959 - acc: 0.9148 - lr: 0.0010

Epoch 150/280
42/42            46s 813ms/step -
loss: 0.2535 - acc: 0.9150 - lr: 0.0010

Epoch 151/280
42/42            46s 813ms/step -
loss: 0.2453 - acc: 0.9151 - lr: 0.0010

Epoch 152/280
42/42            46s 804ms/step -
loss: 0.2684 - acc: 0.9153 - lr: 0.0010

Epoch 153/280
42/42            47s 812ms/step -
loss: 0.2401 - acc: 0.9154 - lr: 0.0010

Epoch 154/280
42/42            46s 813ms/step -
loss: 0.1737 - acc: 0.9156 - lr: 0.0010

Epoch 155/280
42/42            45s 809ms/step -
loss: 0.2027 - acc: 0.9158 - lr: 0.0010

Epoch 156/280
42/42            46s 813ms/step -
loss: 0.3120 - acc: 0.9160 - lr: 0.0010

Epoch 157/280
42/42            46s 813ms/step -
loss: 0.2725 - acc: 0.9161 - lr: 0.0010

Epoch 158/280
42/42            45s 814ms/step -
loss: 0.1684 - acc: 0.9162 - lr: 0.0010

Epoch 159/280
```

```
42/42            46s 814ms/step -
loss: 0.2260 - acc: 0.9164 - lr: 0.0010

Epoch 160/280
42/42            46s 814ms/step -
loss: 0.1522 - acc: 0.9166 - lr: 0.0010

Epoch 161/280
42/42            46s 812ms/step -
loss: 0.1840 - acc: 0.9168 - lr: 0.0010

Epoch 162/280
42/42            47s 813ms/step -
loss: 0.3119 - acc: 0.9170 - lr: 0.0010

Epoch 163/280
42/42            46s 814ms/step -
loss: 0.3000 - acc: 0.9170 - lr: 0.0010

Epoch 164/280
42/42            46s 813ms/step -
loss: 0.2694 - acc: 0.9171 - lr: 0.0010

Epoch 165/280
42/42            46s 813ms/step -
loss: 0.2044 - acc: 0.9172 - lr: 0.0010

Epoch 166/280
42/42            46s 816ms/step -
loss: 0.2985 - acc: 0.9173 - lr: 0.0010

Epoch 167/280
42/42            45s 815ms/step -
loss: 0.1618 - acc: 0.9174 - lr: 0.0010

Epoch 168/280
42/42            46s 813ms/step -
loss: 0.2158 - acc: 0.9176 - lr: 0.0010

Epoch 169/280
42/42            47s 811ms/step -
loss: 0.2733 - acc: 0.9177 - lr: 0.0010

Epoch 170/280
42/42            46s 815ms/step -
loss: 0.2131 - acc: 0.9178 - lr: 0.0010

Epoch 171/280
```

```
42/42            46s 815ms/step -
loss: 0.1526 - acc: 0.9180 - lr: 0.0010

Epoch 172/280
42/42            46s 812ms/step -
loss: 0.1493 - acc: 0.9182 - lr: 0.0010

Epoch 173/280
42/42            46s 814ms/step -
loss: 0.2614 - acc: 0.9185 - lr: 0.0010

Epoch 174/280
42/42            45s 816ms/step -
loss: 0.2125 - acc: 0.9186 - lr: 0.0010

Epoch 175/280
42/42            46s 814ms/step -
loss: 0.2452 - acc: 0.9187 - lr: 0.0010

Epoch 176/280
42/42            46s 813ms/step -
loss: 0.1497 - acc: 0.9188 - lr: 0.0010

Epoch 177/280
42/42            46s 815ms/step -
loss: 0.2064 - acc: 0.9190 - lr: 0.0010

Epoch 178/280
42/42            46s 815ms/step -
loss: 0.2844 - acc: 0.9192 - lr: 0.0010

Epoch 179/280
42/42            46s 802ms/step -
loss: 0.1512 - acc: 0.9193 - lr: 0.0010

Epoch 180/280
42/42            46s 814ms/step -
loss: 0.1759 - acc: 0.9195 - lr: 0.0010

Epoch 181/280
42/42            46s 814ms/step -
loss: 0.1439 - acc: 0.9197 - lr: 0.0010

Epoch 182/280
42/42            46s 813ms/step -
loss: 0.2826 - acc: 0.9199 - lr: 0.0010

Epoch 183/280
```

```
42/42            46s 811ms/step -
loss: 0.1823 - acc: 0.9200 - lr: 0.0010

Epoch 184/280
42/42            46s 813ms/step -
loss: 0.1890 - acc: 0.9201 - lr: 0.0010

Epoch 185/280
42/42            86s 2s/step - loss:
0.2814 - acc: 0.9203 - lr: 0.0010

Epoch 186/280
42/42            45s 806ms/step -
loss: 0.1866 - acc: 0.9204 - lr: 0.0010

Epoch 187/280
42/42            46s 813ms/step -
loss: 0.2173 - acc: 0.9205 - lr: 0.0010

Epoch 188/280
42/42            46s 813ms/step -
loss: 0.2215 - acc: 0.9206 - lr: 0.0010

Epoch 189/280
42/42            46s 811ms/step -
loss: 0.2101 - acc: 0.9207 - lr: 0.0010

Epoch 190/280
42/42            45s 813ms/step -
loss: 0.2377 - acc: 0.9209 - lr: 0.0010

Epoch 191/280
42/42            46s 815ms/step -
loss: 0.1722 - acc: 0.9210 - lr: 0.0010

Epoch 192/280
42/42            46s 814ms/step -
loss: 0.2418 - acc: 0.9211 - lr: 0.0010

Epoch 193/280
42/42            46s 812ms/step -
loss: 0.1703 - acc: 0.9212 - lr: 0.0010

Epoch 194/280
42/42            46s 815ms/step -
loss: 0.3122 - acc: 0.9214 - lr: 0.0010

Epoch 195/280
```

```
42/42            47s 813ms/step -
loss: 0.1540 - acc: 0.9214 - lr: 0.0010

Epoch 196/280
42/42            46s 814ms/step -
loss: 0.2604 - acc: 0.9216 - lr: 0.0010

Epoch 197/280
42/42            47s 811ms/step -
loss: 0.2166 - acc: 0.9216 - lr: 0.0010

Epoch 198/280
42/42            46s 814ms/step -
loss: 0.2714 - acc: 0.9217 - lr: 0.0010

Epoch 199/280
42/42            46s 814ms/step -
loss: 0.2616 - acc: 0.9218 - lr: 0.0010

Epoch 200/280
42/42            46s 813ms/step -
loss: 0.2135 - acc: 0.9218 - lr: 0.0010

Epoch 201/280
42/42            46s 813ms/step -
loss: 0.2177 - acc: 0.9219 - lr: 0.0010

Epoch 202/280
42/42            47s 812ms/step -
loss: 0.2515 - acc: 0.9220 - lr: 0.0010

Epoch 203/280
42/42            47s 813ms/step -
loss: 0.2483 - acc: 0.9221 - lr: 0.0010

Epoch 204/280
42/42            46s 812ms/step -
loss: 0.2985 - acc: 0.9221 - lr: 0.0010

Epoch 205/280
42/42            46s 812ms/step -
loss: 0.2189 - acc: 0.9222 - lr: 0.0010

Epoch 206/280
42/42            47s 816ms/step -
loss: 0.1928 - acc: 0.9223 - lr: 0.0010

Epoch 207/280
```

```
42/42            47s 812ms/step -
loss: 0.2248 - acc: 0.9224 - lr: 0.0010

Epoch 208/280
42/42            47s 811ms/step -
loss: 0.3031 - acc: 0.9225 - lr: 0.0010

Epoch 209/280
42/42            46s 813ms/step -
loss: 0.2373 - acc: 0.9225 - lr: 0.0010

Epoch 210/280
42/42            47s 813ms/step -
loss: 0.1588 - acc: 0.9226 - lr: 0.0010

Epoch 211/280
42/42            47s 813ms/step -
loss: 0.1450 - acc: 0.9227 - lr: 0.0010

Epoch 212/280
42/42            46s 811ms/step -
loss: 0.2815 - acc: 0.9229 - lr: 0.0010

Epoch 213/280
42/42            45s 814ms/step -
loss: 0.2016 - acc: 0.9230 - lr: 0.0010

Epoch 214/280
42/42            47s 816ms/step -
loss: 0.1420 - acc: 0.9231 - lr: 0.0010

Epoch 215/280
42/42            47s 816ms/step -
loss: 0.2805 - acc: 0.9232 - lr: 0.0010

Epoch 216/280
42/42            46s 814ms/step -
loss: 0.1468 - acc: 0.9233 - lr: 0.0010

Epoch 217/280
42/42            47s 816ms/step -
loss: 0.2633 - acc: 0.9234 - lr: 0.0010

Epoch 218/280
42/42            47s 817ms/step -
loss: 0.2266 - acc: 0.9234 - lr: 0.0010

Epoch 219/280
```

```
42/42            47s 815ms/step -
loss: 0.3109 - acc: 0.9235 - lr: 0.0010

Epoch 220/280
42/42            47s 814ms/step -
loss: 0.2484 - acc: 0.9235 - lr: 0.0010

Epoch 221/280
42/42            47s 815ms/step -
loss: 0.1680 - acc: 0.9236 - lr: 0.0010

Epoch 222/280
42/42            47s 816ms/step -
loss: 0.2936 - acc: 0.9237 - lr: 0.0010

Epoch 223/280
42/42            47s 815ms/step -
loss: 0.2509 - acc: 0.9237 - lr: 0.0010

Epoch 224/280
42/42            46s 812ms/step -
loss: 0.1988 - acc: 0.9238 - lr: 0.0010

Epoch 225/280
42/42            46s 818ms/step -
loss: 0.2883 - acc: 0.9239 - lr: 0.0010

Epoch 226/280
42/42            46s 817ms/step -
loss: 0.2046 - acc: 0.9239 - lr: 0.0010

Epoch 227/280
42/42            46s 814ms/step -
loss: 0.2482 - acc: 0.9240 - lr: 0.0010

Epoch 228/280
42/42            47s 814ms/step -
loss: 0.1439 - acc: 0.9241 - lr: 0.0010

Epoch 229/280
42/42            46s 817ms/step -
loss: 0.2760 - acc: 0.9243 - lr: 0.0010

Epoch 230/280
42/42            47s 817ms/step -
loss: 0.1405 - acc: 0.9243 - lr: 0.0010

Epoch 231/280
```

```
42/42            47s 814ms/step -
loss: 0.2592 - acc: 0.9245 - lr: 0.0010

Epoch 232/280
42/42            46s 816ms/step -
loss: 0.2053 - acc: 0.9245 - lr: 0.0010

Epoch 233/280
42/42            47s 819ms/step -
loss: 0.1986 - acc: 0.9246 - lr: 0.0010

Epoch 234/280
42/42            46s 811ms/step -
loss: 0.2087 - acc: 0.9247 - lr: 0.0010

Epoch 235/280
42/42            46s 813ms/step -
loss: 0.2625 - acc: 0.9248 - lr: 0.0010

Epoch 236/280
42/42            46s 816ms/step -
loss: 0.3086 - acc: 0.9248 - lr: 0.0010

Epoch 237/280
42/42            47s 816ms/step -
loss: 0.2570 - acc: 0.9247 - lr: 0.0010

Epoch 238/280
42/42            47s 815ms/step -
loss: 0.1730 - acc: 0.9248 - lr: 0.0010

Epoch 239/280
42/42            47s 816ms/step -
loss: 0.2149 - acc: 0.9249 - lr: 0.0010

Epoch 240/280
42/42            46s 818ms/step -
loss: 0.2296 - acc: 0.9250 - lr: 0.0010
2025-02-16 20:31:31.730861: I tensorflow/core/framework/local_rendezvous.cc:405]
Local rendezvous is aborting with status: OUT_OF_RANGE: End of sequence


Epoch 241/280
42/42            47s 813ms/step -
loss: 0.2345 - acc: 0.9251 - lr: 0.0010

Epoch 242/280
42/42            47s 814ms/step -
```

```
loss: 0.2100 - acc: 0.9251 - lr: 0.0010

Epoch 243/280
42/42            45s 810ms/step -
loss: 0.1686 - acc: 0.9252 - lr: 0.0010

Epoch 244/280
42/42            45s 814ms/step -
loss: 0.1373 - acc: 0.9254 - lr: 0.0010

Epoch 245/280
42/42            47s 814ms/step -
loss: 0.1358 - acc: 0.9255 - lr: 0.0010

Epoch 246/280
42/42            47s 801ms/step -
loss: 0.1348 - acc: 0.9257 - lr: 0.0010

Epoch 247/280
42/42            46s 813ms/step -
loss: 0.2951 - acc: 0.9258 - lr: 0.0010

Epoch 248/280
42/42            46s 815ms/step -
loss: 0.2703 - acc: 0.9258 - lr: 0.0010

Epoch 249/280
42/42            47s 814ms/step -
loss: 0.1704 - acc: 0.9259 - lr: 0.0010

Epoch 250/280
42/42            47s 812ms/step -
loss: 0.1855 - acc: 0.9260 - lr: 0.0010

Epoch 251/280
42/42            46s 813ms/step -
loss: 0.2564 - acc: 0.9261 - lr: 0.0010

Epoch 252/280
42/42            47s 813ms/step -
loss: 0.2152 - acc: 0.9261 - lr: 0.0010

Epoch 253/280
42/42            46s 814ms/step -
loss: 0.2152 - acc: 0.9262 - lr: 0.0010

Epoch 254/280
42/42            46s 814ms/step -
```

```
loss: 0.2815 - acc: 0.9262 - lr: 0.0010

Epoch 255/280
42/42            47s 812ms/step -
loss: 0.1838 - acc: 0.9263 - lr: 0.0010

Epoch 256/280
42/42            47s 813ms/step -
loss: 0.1469 - acc: 0.9264 - lr: 0.0010

Epoch 257/280
42/42            46s 814ms/step -
loss: 0.3072 - acc: 0.9265 - lr: 0.0010

Epoch 258/280
42/42            47s 812ms/step -
loss: 0.2564 - acc: 0.9265 - lr: 0.0010

Epoch 259/280
42/42            48s 848ms/step -
loss: 0.1693 - acc: 0.9265 - lr: 0.0010

Epoch 260/280
42/42            48s 855ms/step -
loss: 0.1647 - acc: 0.9266 - lr: 0.0010

Epoch 261/280
42/42            48s 854ms/step -
loss: 0.3618 - acc: 0.9267 - lr: 0.0010

Epoch 262/280
42/42            49s 857ms/step -
loss: 0.1474 - acc: 0.9267 - lr: 0.0010

Epoch 263/280
42/42            49s 864ms/step -
loss: 0.1465 - acc: 0.9268 - lr: 0.0010

Epoch 264/280
42/42            47s 867ms/step -
loss: 0.2267 - acc: 0.9270 - lr: 0.0010

Epoch 265/280
42/42            48s 857ms/step -
loss: 0.2733 - acc: 0.9270 - lr: 0.0010

Epoch 266/280
42/42            48s 865ms/step -
```

```
loss: 0.1371 - acc: 0.9270 - lr: 0.0010

Epoch 267/280
42/42            49s 865ms/step -
loss: 0.2161 - acc: 0.9272 - lr: 0.0010

Epoch 268/280
42/42            49s 865ms/step -
loss: 0.1408 - acc: 0.9272 - lr: 0.0010

Epoch 269/280
42/42            50s 877ms/step -
loss: 0.1354 - acc: 0.9274 - lr: 0.0010

Epoch 270/280
42/42            49s 865ms/step -
loss: 0.2304 - acc: 0.9275 - lr: 0.0010

Epoch 271/280
42/42            49s 864ms/step -
loss: 0.2142 - acc: 0.9275 - lr: 0.0010

Epoch 272/280
42/42            48s 864ms/step -
loss: 0.3754 - acc: 0.9276 - lr: 0.0010

Epoch 273/280
42/42            49s 865ms/step -
loss: 0.1992 - acc: 0.9275 - lr: 0.0010

Epoch 274/280
42/42            49s 866ms/step -
loss: 0.2443 - acc: 0.9276 - lr: 0.0010

Epoch 275/280
42/42            49s 866ms/step -
loss: 0.2658 - acc: 0.9276 - lr: 0.0010

Epoch 276/280
42/42            49s 867ms/step -
loss: 0.2771 - acc: 0.9276 - lr: 0.0010

Epoch 277/280
42/42            48s 864ms/step -
loss: 0.2882 - acc: 0.9277 - lr: 0.0010

Epoch 278/280
42/42            48s 868ms/step -
```

```
loss: 0.2673 - acc: 0.9277 - lr: 0.0010

Epoch 279/280
42/42            48s 861ms/step -
loss: 0.1836 - acc: 0.9277 - lr: 0.0010

Epoch 280/280
42/42            49s 867ms/step -
loss: 0.2302 - acc: 0.9278 - lr: 0.0010
```

6 Submission

[ ]:
```
def process_test(img):
    clh = cv.createCLAHE(clipLimit=2.0, tileGridSize=(8, 8))
    clh_img = clh.apply(np.squeeze(img.numpy()))
    return tf.constant(np.expand_dims(clh_img / 255.0, -1), dtype=tf.float32,␣
 ↪shape=img.get_shape())
```

[ ]:
```
hela_test = tfds.load("hela_test", data_dir=tf_dir)

hela_sub = hela_test["01"].concatenate(hela_test["02"])\
                          .map(lambda pair: tf.py_function(process_test,␣
 ↪inp=[pair["image"]],
                                                           Tout=[tf.float32]),
                               num_parallel_calls=tf.data.AUTOTUNE)\
                          .map(lambda X: tf.ensure_shape(X, img_shape))\
                          .cache(f"{tf_dir}/TFCache/SUBMISSION")
hela_sub = hela_sub.batch(hela_sub.cardinality().numpy(), num_parallel_calls=tf.
 ↪data.AUTOTUNE)
```

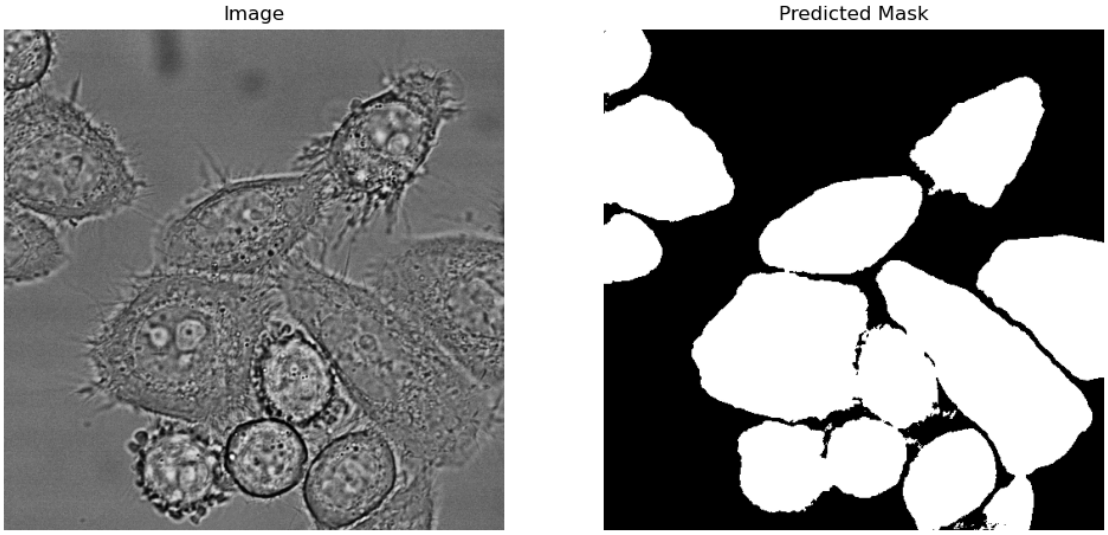
[ ]:
```
sub_pred = helper.model.predict(hela_sub.rebatch(2 * batch_size)).
 ↪argmax(axis=-1)

for i in range(sub_pred.shape[0]):
    cv.imwrite(f"Predictions/pred{str(i).zfill(4)}.png", (sub_pred[i] * 255.0).
 ↪astype("uint8"))
```

```
W0000 00:00:1739750600.940241 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.
W0000 00:00:1739750600.940363 1711261 auto_shard.cc:553] The
`assert_cardinality` transformation is currently not handled by the auto-shard
rewrite and will be removed.

15/15            14s 642ms/step

/home/gabrielribcesario/miniconda3/envs/pdrop/lib/python3.12/site-
packages/keras/src/trainers/epoch_iterator.py:151: UserWarning: Your input ran
```

```
out of data; interrupting training. Make sure that your dataset or generator can
generate at least `steps_per_epoch * epochs` batches. You may need to use the
`.repeat()` function when building your dataset.
  self._interrupted_warning()
```

[21]:
```
X_t = list(hela_sub.take(1))[0]
```

[ ]:
```
j = 7

subtitles = ["Image", "Predicted Mask"]
image_list = [X_t[j], sub_pred[j]]

fig, ax = plt.subplots(1, 2, figsize=(12, 24))
for i in range(2):
    ax[i].imshow(image_list[i], cmap="gray")
    ax[i].set_title(subtitles[i])
    ax[i].axis("off")
plt.show()
```



[23]:
```
# https://www.youtube.com/watch?v=dQw4w9WgXcQ
```