Assignment Report

Submitted By:
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1.Data Preparation

- **Loading data from Google drive in a numpy array**
- **Train data size : Image - 1160 , Mask - 1160**
- **Test Data size : Image - 542, Mask - 542**
- **Valid Data size : Image - 569, Mask - 569**
- **Original image size was 320*320 and we resize the image to 128*128**
- **Normalization of images by subtracting mean and then dividing by standard deviation**
- **ImageDataGenerator library is used to create augmented data.**

2. Model Architecture

We have used 2 models:

1.uNet_4

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 Layer (type)                    Output Shape         Param #
Connected to
==========================================================================
==========================
 input_1 (InputLayer)            [(None, 128, 128, 1  0              []
                                 )]

 conv2d (Conv2D)                 (None, 128, 128, 11  1120
['input_1[0][0]']
                                 2)

 conv2d_1 (Conv2D)               (None, 128, 128, 11  113008
['conv2d[0][0]']
                                 2)
```

```
 max_pooling2d (MaxPooling2D)    (None, 64, 64, 112)   0
['conv2d_1[0][0]']

 conv2d_2 (Conv2D)              (None, 64, 64, 224)   226016
['max_pooling2d[0][0]']

 conv2d_3 (Conv2D)              (None, 64, 64, 224)   451808
['conv2d_2[0][0]']

 max_pooling2d_1 (MaxPooling2D)  (None, 32, 32, 224)   0
['conv2d_3[0][0]']

 conv2d_4 (Conv2D)              (None, 32, 32, 448)   903616
['max_pooling2d_1[0][0]']

 conv2d_5 (Conv2D)              (None, 32, 32, 448)   1806784
['conv2d_4[0][0]']

 max_pooling2d_2 (MaxPooling2D)  (None, 16, 16, 448)   0
['conv2d_5[0][0]']

 conv2d_6 (Conv2D)              (None, 16, 16, 448)   1806784
['max_pooling2d_2[0][0]']

 conv2d_7 (Conv2D)              (None, 16, 16, 448)   1806784
['conv2d_6[0][0]']

 conv2d_transpose (Conv2DTransp  (None, 32, 32, 448)   803264
['conv2d_7[0][0]']
 ose)

 concatenate (Concatenate)      (None, 32, 32, 896)   0
['conv2d_transpose[0][0]',

'conv2d_5[0][0]']

 conv2d_8 (Conv2D)              (None, 32, 32, 224)   1806560
['concatenate[0][0]']

 dropout (Dropout)              (None, 32, 32, 224)   0
['conv2d_8[0][0]']

 conv2d_9 (Conv2D)              (None, 32, 32, 224)   451808
['dropout[0][0]']

 conv2d_transpose_1 (Conv2DTran  (None, 64, 64, 224)   200928
['conv2d_9[0][0]']
 spose)
```

```
 concatenate_1 (Concatenate)      (None, 64, 64, 448)  0
['conv2d_transpose_1[0][0]',

'conv2d_3[0][0]']

 conv2d_10 (Conv2D)               (None, 64, 64, 112)   451696
['concatenate_1[0][0]']

 dropout_1 (Dropout)              (None, 64, 64, 112)   0
['conv2d_10[0][0]']

 conv2d_11 (Conv2D)               (None, 64, 64, 112)   113008
['dropout_1[0][0]']

 conv2d_transpose_2 (Conv2DTran   (None, 128, 128, 11   50288
['conv2d_11[0][0]']
 spose)                            2)

 concatenate_2 (Concatenate)      (None, 128, 128, 22   0
['conv2d_transpose_2[0][0]',
                                   4)

'conv2d_1[0][0]']

 conv2d_12 (Conv2D)               (None, 128, 128, 11   225904
['concatenate_2[0][0]']
                                   2)

 dropout_2 (Dropout)              (None, 128, 128, 11   0
['conv2d_12[0][0]']
                                   2)

 conv2d_13 (Conv2D)               (None, 128, 128, 11   113008
['dropout_2[0][0]']
                                   2)

 conv2d_14 (Conv2D)               (None, 128, 128, 1)   113
['conv2d_13[0][0]']

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Total params: 11,332,497
Trainable params: 11,332,497
Non-trainable params: 0

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2.uNet_5

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 Layer (type)                    Output Shape          Param #
Connected to
====================================================================
==============================
 input_3 (InputLayer)            [(None, 128, 128, 1    0              []
                                 )]

 conv2d_31 (Conv2D)              (None, 128, 128, 32    320
['input_3[0][0]']
                                 )

 conv2d_32 (Conv2D)              (None, 128, 128, 32    9248
['conv2d_31[0][0]']
                                 )

 max_pooling2d_7 (MaxPooling2D)  (None, 64, 64, 32)     0
['conv2d_32[0][0]']

 conv2d_33 (Conv2D)              (None, 64, 64, 64)     18496
['max_pooling2d_7[0][0]']

 conv2d_34 (Conv2D)              (None, 64, 64, 64)     36928
['conv2d_33[0][0]']

 max_pooling2d_8 (MaxPooling2D)  (None, 32, 32, 64)     0
['conv2d_34[0][0]']

 conv2d_35 (Conv2D)              (None, 32, 32, 128)    73856
['max_pooling2d_8[0][0]']

 conv2d_36 (Conv2D)              (None, 32, 32, 128)    147584
['conv2d_35[0][0]']

 max_pooling2d_9 (MaxPooling2D)  (None, 16, 16, 128)    0
['conv2d_36[0][0]']

 conv2d_37 (Conv2D)              (None, 16, 16, 256)    295168
['max_pooling2d_9[0][0]']

 conv2d_38 (Conv2D)              (None, 16, 16, 256)    590080
['conv2d_37[0][0]']

 max_pooling2d_10 (MaxPooling2D  (None, 8, 8, 256)      0
['conv2d_38[0][0]']
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 conv2d_39 (Conv2D)              (None, 8, 8, 256)    590080
['max_pooling2d_10[0][0]']

 conv2d_40 (Conv2D)              (None, 8, 8, 256)    590080
['conv2d_39[0][0]']

 conv2d_transpose_7 (Conv2DTran  (None, 16, 16, 256)  262400
['conv2d_40[0][0]']
 spose)

 concatenate_7 (Concatenate)    (None, 16, 16, 512)  0
['conv2d_transpose_7[0][0]',

'conv2d_38[0][0]']

 conv2d_41 (Conv2D)              (None, 16, 16, 128)  589952
['concatenate_7[0][0]']

 dropout_6 (Dropout)            (None, 16, 16, 128)  0
['conv2d_41[0][0]']

 conv2d_42 (Conv2D)              (None, 16, 16, 128)  147584
['dropout_6[0][0]']

 conv2d_transpose_8 (Conv2DTran  (None, 32, 32, 128)  65664
['conv2d_42[0][0]']
 spose)

 concatenate_8 (Concatenate)    (None, 32, 32, 256)  0
['conv2d_transpose_8[0][0]',

'conv2d_36[0][0]']

 conv2d_43 (Conv2D)              (None, 32, 32, 64)   147520
['concatenate_8[0][0]']

 dropout_7 (Dropout)            (None, 32, 32, 64)   0
['conv2d_43[0][0]']

 conv2d_44 (Conv2D)              (None, 32, 32, 64)   36928
['dropout_7[0][0]']

 conv2d_transpose_9 (Conv2DTran  (None, 64, 64, 64)   16448
['conv2d_44[0][0]']
 spose)
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concatenate_9 (Concatenate)     (None, 64, 64, 128)   0
['conv2d_transpose_9[0][0]',

'conv2d_34[0][0]']

 conv2d_45 (Conv2D)             (None, 64, 64, 32)    36896
['concatenate_9[0][0]']

 dropout_8 (Dropout)            (None, 64, 64, 32)    0
['conv2d_45[0][0]']

 conv2d_46 (Conv2D)             (None, 64, 64, 32)    9248
['dropout_8[0][0]']

 conv2d_transpose_10 (Conv2DTra  (None, 128, 128, 32   4128
['conv2d_46[0][0]']
 nspose)                         )

 concatenate_10 (Concatenate)   (None, 128, 128, 64   0
['conv2d_transpose_10[0][0]',
                                 )
'conv2d_32[0][0]']

 conv2d_47 (Conv2D)             (None, 128, 128, 32   18464
['concatenate_10[0][0]']
                                 )

 dropout_9 (Dropout)            (None, 128, 128, 32   0
['conv2d_47[0][0]']
                                 )

 conv2d_48 (Conv2D)             (None, 128, 128, 32   9248
['dropout_9[0][0]']
                                 )

 conv2d_49 (Conv2D)             (None, 128, 128, 1)   33
['conv2d_48[0][0]']

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Total params: 3,696,353
Trainable params: 3,696,353
Non-trainable params: 0
_____
_____
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3. Training

a) uNet_4

We have used 100 epochs of batch size 32 to train the model. Performance during training is

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Epoch 1/100
37/37 [==============================] - ETA: 0s - loss: 0.0562 -
dice_coef: 0.1310 - accuracy: 0.9894
Epoch 00001: val_loss improved from inf to 0.00917, saving model to
model2_best.h5
37/37 [==============================] - 103s 2s/step - loss: 0.0562 -
dice_coef: 0.1310 - accuracy: 0.9894 - val_loss: 0.0092 -
val_dice_coef: 0.2479 - val_accuracy: 0.9954
Epoch 2/100
37/37 [==============================] - ETA: 0s - loss: 0.0096 -
dice_coef: 0.3306 - accuracy: 0.9952
Epoch 00002: val_loss improved from 0.00917 to 0.00817, saving model to
model2_best.h5
37/37 [==============================] - 53s 1s/step - loss: 0.0096 -
dice_coef: 0.3306 - accuracy: 0.9952 - val_loss: 0.0082 -
val_dice_coef: 0.3399 - val_accuracy: 0.9961
Epoch 3/100
37/37 [==============================] - ETA: 0s - loss: 0.0069 -
dice_coef: 0.5213 - accuracy: 0.9965
Epoch 00003: val_loss improved from 0.00817 to 0.00739, saving model to
model2_best.h5
37/37 [==============================] - 53s 1s/step - loss: 0.0069 -
dice_coef: 0.5213 - accuracy: 0.9965 - val_loss: 0.0074 -
val_dice_coef: 0.4864 - val_accuracy: 0.9966
Epoch 4/100
37/37 [==============================] - ETA: 0s - loss: 0.0050 -
dice_coef: 0.6594 - accuracy: 0.9972
Epoch 00004: val_loss improved from 0.00739 to 0.00477, saving model to
model2_best.h5
37/37 [==============================] - 53s 1s/step - loss: 0.0050 -
dice_coef: 0.6594 - accuracy: 0.9972 - val_loss: 0.0048 -
val_dice_coef: 0.6584 - val_accuracy: 0.9977
Epoch 5/100
37/37 [==============================] - ETA: 0s - loss: 0.0034 -
dice_coef: 0.7614 - accuracy: 0.9977
Epoch 00005: val_loss did not improve from 0.00477
37/37 [==============================] - 51s 1s/step - loss: 0.0034 -
dice_coef: 0.7614 - accuracy: 0.9977 - val_loss: 0.0052 -
val_dice_coef: 0.7195 - val_accuracy: 0.9978
Epoch 6/100
37/37 [==============================] - ETA: 0s - loss: 0.0028 -
dice_coef: 0.8078 - accuracy: 0.9979
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Epoch 00006: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0028 -
dice_coef: 0.8078 - accuracy: 0.9979 - val_loss: 0.0050 -
val_dice_coef: 0.7541 - val_accuracy: 0.9978
Epoch 7/100
37/37 [==============================] - ETA: 0s - loss: 0.0024 -
dice_coef: 0.8324 - accuracy: 0.9980
Epoch 00007: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0024 -
dice_coef: 0.8324 - accuracy: 0.9980 - val_loss: 0.0048 -
val_dice_coef: 0.7727 - val_accuracy: 0.9979
Epoch 8/100
37/37 [==============================] - ETA: 0s - loss: 0.0021 -
dice_coef: 0.8551 - accuracy: 0.9981
Epoch 00008: val_loss did not improve from 0.00477
37/37 [==============================] - 51s 1s/step - loss: 0.0021 -
dice_coef: 0.8551 - accuracy: 0.9981 - val_loss: 0.0051 -
val_dice_coef: 0.7752 - val_accuracy: 0.9978
Epoch 9/100
37/37 [==============================] - ETA: 0s - loss: 0.0020 -
dice_coef: 0.8600 - accuracy: 0.9982
Epoch 00009: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0020 -
dice_coef: 0.8600 - accuracy: 0.9982 - val_loss: 0.0049 -
val_dice_coef: 0.7608 - val_accuracy: 0.9978
Epoch 10/100
37/37 [==============================] - ETA: 0s - loss: 0.0020 -
dice_coef: 0.8590 - accuracy: 0.9982
Epoch 00010: val_loss did not improve from 0.00477
37/37 [==============================] - 51s 1s/step - loss: 0.0020 -
dice_coef: 0.8590 - accuracy: 0.9982 - val_loss: 0.0059 -
val_dice_coef: 0.7902 - val_accuracy: 0.9980
Epoch 11/100
37/37 [==============================] - ETA: 0s - loss: 0.0018 -
dice_coef: 0.8715 - accuracy: 0.9982
Epoch 00011: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0018 -
dice_coef: 0.8715 - accuracy: 0.9982 - val_loss: 0.0062 -
val_dice_coef: 0.7893 - val_accuracy: 0.9980
Epoch 12/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8839 - accuracy: 0.9983
Epoch 00012: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0016 -
dice_coef: 0.8839 - accuracy: 0.9983 - val_loss: 0.0060 -
val_dice_coef: 0.7836 - val_accuracy: 0.9978
Epoch 13/100
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37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8854 - accuracy: 0.9983
Epoch 00013: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0016 -
dice_coef: 0.8854 - accuracy: 0.9983 - val_loss: 0.0053 -
val_dice_coef: 0.7916 - val_accuracy: 0.9979
Epoch 14/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8903 - accuracy: 0.9983
Epoch 00014: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0015 -
dice_coef: 0.8903 - accuracy: 0.9983 - val_loss: 0.0064 -
val_dice_coef: 0.7998 - val_accuracy: 0.9980
Epoch 15/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8946 - accuracy: 0.9983
Epoch 00015: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0015 -
dice_coef: 0.8946 - accuracy: 0.9983 - val_loss: 0.0056 -
val_dice_coef: 0.7916 - val_accuracy: 0.9979
Epoch 16/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8956 - accuracy: 0.9983
Epoch 00016: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0015 -
dice_coef: 0.8956 - accuracy: 0.9983 - val_loss: 0.0055 -
val_dice_coef: 0.7960 - val_accuracy: 0.9979
Epoch 17/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.9002 - accuracy: 0.9983
Epoch 00017: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0014 -
dice_coef: 0.9002 - accuracy: 0.9983 - val_loss: 0.0072 -
val_dice_coef: 0.7902 - val_accuracy: 0.9979
Epoch 18/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8978 - accuracy: 0.9983
Epoch 00018: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0014 -
dice_coef: 0.8978 - accuracy: 0.9983 - val_loss: 0.0067 -
val_dice_coef: 0.8002 - val_accuracy: 0.9979
Epoch 19/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8977 - accuracy: 0.9983
Epoch 00019: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0014 -
dice_coef: 0.8977 - accuracy: 0.9983 - val_loss: 0.0056 -
val_dice_coef: 0.8025 - val_accuracy: 0.9979
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Epoch 20/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9049 - accuracy: 0.9983
Epoch 00020: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0013 -
dice_coef: 0.9049 - accuracy: 0.9983 - val_loss: 0.0074 -
val_dice_coef: 0.8058 - val_accuracy: 0.9980
Epoch 21/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.9012 - accuracy: 0.9983
Epoch 00021: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0014 -
dice_coef: 0.9012 - accuracy: 0.9983 - val_loss: 0.0057 -
val_dice_coef: 0.7999 - val_accuracy: 0.9979
Epoch 22/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8981 - accuracy: 0.9983
Epoch 00022: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0014 -
dice_coef: 0.8981 - accuracy: 0.9983 - val_loss: 0.0056 -
val_dice_coef: 0.8087 - val_accuracy: 0.9979
Epoch 23/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9075 - accuracy: 0.9983
Epoch 00023: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0013 -
dice_coef: 0.9075 - accuracy: 0.9983 - val_loss: 0.0066 -
val_dice_coef: 0.8055 - val_accuracy: 0.9980
Epoch 24/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9071 - accuracy: 0.9983
Epoch 00024: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0013 -
dice_coef: 0.9071 - accuracy: 0.9983 - val_loss: 0.0075 -
val_dice_coef: 0.8026 - val_accuracy: 0.9979
Epoch 25/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9102 - accuracy: 0.9984
Epoch 00025: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9102 - accuracy: 0.9984 - val_loss: 0.0074 -
val_dice_coef: 0.7975 - val_accuracy: 0.9980
Epoch 26/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9096 - accuracy: 0.9984
Epoch 00026: val_loss did not improve from 0.00477
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37/37 [==============================] - 50s 1s/step - loss: 0.0013 -
dice_coef: 0.9096 - accuracy: 0.9984 - val_loss: 0.0067 -
val_dice_coef: 0.7978 - val_accuracy: 0.9980
Epoch 27/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9114 - accuracy: 0.9984
Epoch 00027: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9114 - accuracy: 0.9984 - val_loss: 0.0084 -
val_dice_coef: 0.7973 - val_accuracy: 0.9980
Epoch 28/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9104 - accuracy: 0.9984
Epoch 00028: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9104 - accuracy: 0.9984 - val_loss: 0.0055 -
val_dice_coef: 0.8172 - val_accuracy: 0.9981
Epoch 29/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9109 - accuracy: 0.9984
Epoch 00029: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9109 - accuracy: 0.9984 - val_loss: 0.0072 -
val_dice_coef: 0.8048 - val_accuracy: 0.9980
Epoch 30/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9181 - accuracy: 0.9984
Epoch 00030: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9181 - accuracy: 0.9984 - val_loss: 0.0078 -
val_dice_coef: 0.8055 - val_accuracy: 0.9980
Epoch 31/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9169 - accuracy: 0.9984
Epoch 00031: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9169 - accuracy: 0.9984 - val_loss: 0.0083 -
val_dice_coef: 0.8001 - val_accuracy: 0.9980
Epoch 32/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9179 - accuracy: 0.9984
Epoch 00032: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9179 - accuracy: 0.9984 - val_loss: 0.0086 -
val_dice_coef: 0.7987 - val_accuracy: 0.9980
Epoch 33/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9177 - accuracy: 0.9984
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Epoch 00033: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9177 - accuracy: 0.9984 - val_loss: 0.0086 -
val_dice_coef: 0.8033 - val_accuracy: 0.9980
Epoch 34/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9149 - accuracy: 0.9984
Epoch 00034: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9149 - accuracy: 0.9984 - val_loss: 0.0062 -
val_dice_coef: 0.8052 - val_accuracy: 0.9980
Epoch 35/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9182 - accuracy: 0.9984
Epoch 00035: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9182 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8105 - val_accuracy: 0.9980
Epoch 36/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9162 - accuracy: 0.9984
Epoch 00036: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9162 - accuracy: 0.9984 - val_loss: 0.0075 -
val_dice_coef: 0.8089 - val_accuracy: 0.9980
Epoch 37/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9177 - accuracy: 0.9984
Epoch 00037: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9177 - accuracy: 0.9984 - val_loss: 0.0080 -
val_dice_coef: 0.8086 - val_accuracy: 0.9980
Epoch 38/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9197 - accuracy: 0.9984
Epoch 00038: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9197 - accuracy: 0.9984 - val_loss: 0.0074 -
val_dice_coef: 0.8051 - val_accuracy: 0.9980
Epoch 39/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9174 - accuracy: 0.9984
Epoch 00039: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9174 - accuracy: 0.9984 - val_loss: 0.0072 -
val_dice_coef: 0.8048 - val_accuracy: 0.9980
Epoch 40/100
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37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9199 - accuracy: 0.9984
Epoch 00040: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9199 - accuracy: 0.9984 - val_loss: 0.0083 -
val_dice_coef: 0.8041 - val_accuracy: 0.9980
Epoch 41/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9167 - accuracy: 0.9984
Epoch 00041: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9167 - accuracy: 0.9984 - val_loss: 0.0048 -
val_dice_coef: 0.7906 - val_accuracy: 0.9979
Epoch 42/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9134 - accuracy: 0.9984
Epoch 00042: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0012 -
dice_coef: 0.9134 - accuracy: 0.9984 - val_loss: 0.0060 -
val_dice_coef: 0.8055 - val_accuracy: 0.9980
Epoch 43/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9182 - accuracy: 0.9984
Epoch 00043: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9182 - accuracy: 0.9984 - val_loss: 0.0066 -
val_dice_coef: 0.8105 - val_accuracy: 0.9980
Epoch 44/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9214 - accuracy: 0.9984
Epoch 00044: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9214 - accuracy: 0.9984 - val_loss: 0.0068 -
val_dice_coef: 0.8083 - val_accuracy: 0.9980
Epoch 45/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9212 - accuracy: 0.9984
Epoch 00045: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9212 - accuracy: 0.9984 - val_loss: 0.0077 -
val_dice_coef: 0.8054 - val_accuracy: 0.9980
Epoch 46/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9227 - accuracy: 0.9984
Epoch 00046: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9227 - accuracy: 0.9984 - val_loss: 0.0075 -
val_dice_coef: 0.8066 - val_accuracy: 0.9980
```

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Epoch 47/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9220 - accuracy: 0.9984
Epoch 00047: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9220 - accuracy: 0.9984 - val_loss: 0.0073 -
val_dice_coef: 0.8106 - val_accuracy: 0.9980
Epoch 48/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9208 - accuracy: 0.9984
Epoch 00048: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9208 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8098 - val_accuracy: 0.9980
Epoch 49/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9223 - accuracy: 0.9984
Epoch 00049: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9223 - accuracy: 0.9984 - val_loss: 0.0071 -
val_dice_coef: 0.8147 - val_accuracy: 0.9980
Epoch 50/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9235 - accuracy: 0.9984
Epoch 00050: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9235 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8067 - val_accuracy: 0.9980
Epoch 51/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9225 - accuracy: 0.9984
Epoch 00051: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9225 - accuracy: 0.9984 - val_loss: 0.0067 -
val_dice_coef: 0.8090 - val_accuracy: 0.9980
Epoch 52/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9226 - accuracy: 0.9984
Epoch 00052: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9226 - accuracy: 0.9984 - val_loss: 0.0086 -
val_dice_coef: 0.8037 - val_accuracy: 0.9980
Epoch 53/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9248 - accuracy: 0.9984
Epoch 00053: val_loss did not improve from 0.00477
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37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9248 - accuracy: 0.9984 - val_loss: 0.0087 -
val_dice_coef: 0.8070 - val_accuracy: 0.9980
Epoch 54/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9246 - accuracy: 0.9984
Epoch 00054: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9246 - accuracy: 0.9984 - val_loss: 0.0081 -
val_dice_coef: 0.8089 - val_accuracy: 0.9980
Epoch 55/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9242 - accuracy: 0.9984
Epoch 00055: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9242 - accuracy: 0.9984 - val_loss: 0.0067 -
val_dice_coef: 0.8089 - val_accuracy: 0.9980
Epoch 56/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9220 - accuracy: 0.9984
Epoch 00056: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0011 -
dice_coef: 0.9220 - accuracy: 0.9984 - val_loss: 0.0088 -
val_dice_coef: 0.8000 - val_accuracy: 0.9980
Epoch 57/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9240 - accuracy: 0.9984
Epoch 00057: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9240 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8087 - val_accuracy: 0.9980
Epoch 58/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9240 - accuracy: 0.9984
Epoch 00058: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9240 - accuracy: 0.9984 - val_loss: 0.0086 -
val_dice_coef: 0.8044 - val_accuracy: 0.9980
Epoch 59/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9255 - accuracy: 0.9984
Epoch 00059: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9255 - accuracy: 0.9984 - val_loss: 0.0093 -
val_dice_coef: 0.7976 - val_accuracy: 0.9980
Epoch 60/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9255 - accuracy: 0.9984
```

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Epoch 00060: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9255 - accuracy: 0.9984 - val_loss: 0.0080 -
val_dice_coef: 0.8087 - val_accuracy: 0.9980
Epoch 61/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9252 - accuracy: 0.9984
Epoch 00061: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9252 - accuracy: 0.9984 - val_loss: 0.0093 -
val_dice_coef: 0.8003 - val_accuracy: 0.9980
Epoch 62/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9256 - accuracy: 0.9984
Epoch 00062: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9256 - accuracy: 0.9984 - val_loss: 0.0079 -
val_dice_coef: 0.8050 - val_accuracy: 0.9980
Epoch 63/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9253 - accuracy: 0.9984
Epoch 00063: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9253 - accuracy: 0.9984 - val_loss: 0.0089 -
val_dice_coef: 0.8108 - val_accuracy: 0.9981
Epoch 64/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9261 - accuracy: 0.9984
Epoch 00064: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9261 - accuracy: 0.9984 - val_loss: 0.0084 -
val_dice_coef: 0.8048 - val_accuracy: 0.9980
Epoch 65/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9262 - accuracy: 0.9984
Epoch 00065: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9262 - accuracy: 0.9984 - val_loss: 0.0088 -
val_dice_coef: 0.8060 - val_accuracy: 0.9980
Epoch 66/100
37/37 [==============================] - ETA: 0s - loss: 9.9451e-04 -
dice_coef: 0.9266 - accuracy: 0.9984
Epoch 00066: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 9.9451e-04
- dice_coef: 0.9266 - accuracy: 0.9984 - val_loss: 0.0094 -
val_dice_coef: 0.8057 - val_accuracy: 0.9980
Epoch 67/100
```

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37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9254 - accuracy: 0.9984
Epoch 00067: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9254 - accuracy: 0.9984 - val_loss: 0.0094 -
val_dice_coef: 0.8038 - val_accuracy: 0.9980
Epoch 68/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9253 - accuracy: 0.9984
Epoch 00068: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9253 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8101 - val_accuracy: 0.9980
Epoch 69/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9259 - accuracy: 0.9984
Epoch 00069: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9259 - accuracy: 0.9984 - val_loss: 0.0083 -
val_dice_coef: 0.8076 - val_accuracy: 0.9980
Epoch 70/100
37/37 [==============================] - ETA: 0s - loss: 9.9221e-04 -
dice_coef: 0.9268 - accuracy: 0.9984
Epoch 00070: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 9.9221e-04
- dice_coef: 0.9268 - accuracy: 0.9984 - val_loss: 0.0097 -
val_dice_coef: 0.8038 - val_accuracy: 0.9980
Epoch 71/100
37/37 [==============================] - ETA: 0s - loss: 0.0010 -
dice_coef: 0.9230 - accuracy: 0.9984
Epoch 00071: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 0.0010 -
dice_coef: 0.9230 - accuracy: 0.9984 - val_loss: 0.0094 -
val_dice_coef: 0.8083 - val_accuracy: 0.9980
Epoch 72/100
37/37 [==============================] - ETA: 0s - loss: 9.9241e-04 -
dice_coef: 0.9268 - accuracy: 0.9984
Epoch 00072: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 9.9241e-04
- dice_coef: 0.9268 - accuracy: 0.9984 - val_loss: 0.0100 -
val_dice_coef: 0.8047 - val_accuracy: 0.9980
Epoch 73/100
37/37 [==============================] - ETA: 0s - loss: 9.8984e-04 -
dice_coef: 0.9267 - accuracy: 0.9984
Epoch 00073: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 9.8984e-04
- dice_coef: 0.9267 - accuracy: 0.9984 - val_loss: 0.0092 -
val_dice_coef: 0.8073 - val_accuracy: 0.9980
```

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Epoch 74/100
37/37 [==============================] - ETA: 0s - loss: 9.9080e-04 -
dice_coef: 0.9268 - accuracy: 0.9984
Epoch 00074: val_loss did not improve from 0.00477
37/37 [==============================] - 50s 1s/step - loss: 9.9080e-04
- dice_coef: 0.9268 - accuracy: 0.9984 - val_loss: 0.0098 -
val_dice_coef: 0.8028 - val_accuracy: 0.9980
```

b) uNet_5

```
Epoch 1/100
37/37 [==============================] - ETA: 0s - loss: 0.1454 -
dice_coef: 0.0256 - accuracy: 0.9823
Epoch 00001: val_loss improved from inf to 0.01223, saving model to
model3_best.h5
37/37 [==============================] - 21s 413ms/step - loss: 0.1454
- dice_coef: 0.0256 - accuracy: 0.9823 - val_loss: 0.0122 -
val_dice_coef: 0.1388 - val_accuracy: 0.9954
Epoch 2/100
37/37 [==============================] - ETA: 0s - loss: 0.0114 -
dice_coef: 0.2501 - accuracy: 0.9948
Epoch 00002: val_loss improved from 0.01223 to 0.00779, saving model to
model3_best.h5
37/37 [==============================] - 11s 307ms/step - loss: 0.0114
- dice_coef: 0.2501 - accuracy: 0.9948 - val_loss: 0.0078 -
val_dice_coef: 0.2956 - val_accuracy: 0.9954
Epoch 3/100
37/37 [==============================] - ETA: 0s - loss: 0.0082 -
dice_coef: 0.3669 - accuracy: 0.9948
Epoch 00003: val_loss improved from 0.00779 to 0.00754, saving model to
model3_best.h5
37/37 [==============================] - 12s 333ms/step - loss: 0.0082
- dice_coef: 0.3669 - accuracy: 0.9948 - val_loss: 0.0075 -
val_dice_coef: 0.3281 - val_accuracy: 0.9954
Epoch 4/100
37/37 [==============================] - ETA: 0s - loss: 0.0076 -
dice_coef: 0.3992 - accuracy: 0.9948
Epoch 00004: val_loss improved from 0.00754 to 0.00639, saving model to
model3_best.h5
37/37 [==============================] - 12s 330ms/step - loss: 0.0076
- dice_coef: 0.3992 - accuracy: 0.9948 - val_loss: 0.0064 -
val_dice_coef: 0.3885 - val_accuracy: 0.9954
Epoch 5/100
37/37 [==============================] - ETA: 0s - loss: 0.0065 -
dice_coef: 0.4386 - accuracy: 0.9948
Epoch 00005: val_loss improved from 0.00639 to 0.00595, saving model to
model3_best.h5
```

```
37/37 [==============================] - 12s 332ms/step - loss: 0.0065
- dice_coef: 0.4386 - accuracy: 0.9948 - val_loss: 0.0060 -
val_dice_coef: 0.3983 - val_accuracy: 0.9954
Epoch 6/100
37/37 [==============================] - ETA: 0s - loss: 0.0060 -
dice_coef: 0.4713 - accuracy: 0.9948
Epoch 00006: val_loss did not improve from 0.00595
37/37 [==============================] - 11s 294ms/step - loss: 0.0060
- dice_coef: 0.4713 - accuracy: 0.9948 - val_loss: 0.0063 -
val_dice_coef: 0.4450 - val_accuracy: 0.9954
Epoch 7/100
37/37 [==============================] - ETA: 0s - loss: 0.0055 -
dice_coef: 0.4987 - accuracy: 0.9949
Epoch 00007: val_loss improved from 0.00595 to 0.00567, saving model to
model3_best.h5
37/37 [==============================] - 12s 332ms/step - loss: 0.0055
- dice_coef: 0.4987 - accuracy: 0.9949 - val_loss: 0.0057 -
val_dice_coef: 0.4831 - val_accuracy: 0.9955
Epoch 8/100
37/37 [==============================] - ETA: 0s - loss: 0.0056 -
dice_coef: 0.5056 - accuracy: 0.9950
Epoch 00008: val_loss improved from 0.00567 to 0.00548, saving model to
model3_best.h5
37/37 [==============================] - 11s 308ms/step - loss: 0.0056
- dice_coef: 0.5056 - accuracy: 0.9950 - val_loss: 0.0055 -
val_dice_coef: 0.4672 - val_accuracy: 0.9957
Epoch 9/100
37/37 [==============================] - ETA: 0s - loss: 0.0052 -
dice_coef: 0.5237 - accuracy: 0.9953
Epoch 00009: val_loss improved from 0.00548 to 0.00547, saving model to
model3_best.h5
37/37 [==============================] - 12s 331ms/step - loss: 0.0052
- dice_coef: 0.5237 - accuracy: 0.9953 - val_loss: 0.0055 -
val_dice_coef: 0.5027 - val_accuracy: 0.9963
Epoch 10/100
37/37 [==============================] - ETA: 0s - loss: 0.0048 -
dice_coef: 0.5624 - accuracy: 0.9964
Epoch 00010: val_loss did not improve from 0.00547
37/37 [==============================] - 11s 295ms/step - loss: 0.0048
- dice_coef: 0.5624 - accuracy: 0.9964 - val_loss: 0.0055 -
val_dice_coef: 0.6493 - val_accuracy: 0.9979
Epoch 11/100
37/37 [==============================] - ETA: 0s - loss: 0.0038 -
dice_coef: 0.7198 - accuracy: 0.9976
Epoch 00011: val_loss improved from 0.00547 to 0.00386, saving model to
model3_best.h5
```

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37/37 [==============================] - 12s 330ms/step - loss: 0.0038
- dice_coef: 0.7198 - accuracy: 0.9976 - val_loss: 0.0039 -
val_dice_coef: 0.6765 - val_accuracy: 0.9976
Epoch 12/100
37/37 [==============================] - ETA: 0s - loss: 0.0034 -
dice_coef: 0.7565 - accuracy: 0.9977
Epoch 00012: val_loss did not improve from 0.00386
37/37 [==============================] - 11s 295ms/step - loss: 0.0034
- dice_coef: 0.7565 - accuracy: 0.9977 - val_loss: 0.0039 -
val_dice_coef: 0.7373 - val_accuracy: 0.9980
Epoch 13/100
37/37 [==============================] - ETA: 0s - loss: 0.0028 -
dice_coef: 0.8024 - accuracy: 0.9979
Epoch 00013: val_loss did not improve from 0.00386
37/37 [==============================] - 11s 296ms/step - loss: 0.0028
- dice_coef: 0.8024 - accuracy: 0.9979 - val_loss: 0.0043 -
val_dice_coef: 0.7531 - val_accuracy: 0.9979
Epoch 14/100
37/37 [==============================] - ETA: 0s - loss: 0.0026 -
dice_coef: 0.8197 - accuracy: 0.9980
Epoch 00014: val_loss did not improve from 0.00386
37/37 [==============================] - 11s 295ms/step - loss: 0.0026
- dice_coef: 0.8197 - accuracy: 0.9980 - val_loss: 0.0040 -
val_dice_coef: 0.7308 - val_accuracy: 0.9977
Epoch 15/100
37/37 [==============================] - ETA: 0s - loss: 0.0025 -
dice_coef: 0.8251 - accuracy: 0.9980
Epoch 00015: val_loss improved from 0.00386 to 0.00345, saving model to
model3_best.h5
37/37 [==============================] - 12s 328ms/step - loss: 0.0025
- dice_coef: 0.8251 - accuracy: 0.9980 - val_loss: 0.0034 -
val_dice_coef: 0.7738 - val_accuracy: 0.9980
Epoch 16/100
37/37 [==============================] - ETA: 0s - loss: 0.0023 -
dice_coef: 0.8379 - accuracy: 0.9981
Epoch 00016: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0023
- dice_coef: 0.8379 - accuracy: 0.9981 - val_loss: 0.0036 -
val_dice_coef: 0.7866 - val_accuracy: 0.9980
Epoch 17/100
37/37 [==============================] - ETA: 0s - loss: 0.0023 -
dice_coef: 0.8406 - accuracy: 0.9981
Epoch 00017: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 294ms/step - loss: 0.0023
- dice_coef: 0.8406 - accuracy: 0.9981 - val_loss: 0.0038 -
val_dice_coef: 0.7887 - val_accuracy: 0.9980
Epoch 18/100
```

```
37/37 [==============================] - ETA: 0s - loss: 0.0021 -
dice_coef: 0.8511 - accuracy: 0.9981
Epoch 00018: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0021
- dice_coef: 0.8511 - accuracy: 0.9981 - val_loss: 0.0038 -
val_dice_coef: 0.7933 - val_accuracy: 0.9980
Epoch 19/100
37/37 [==============================] - ETA: 0s - loss: 0.0020 -
dice_coef: 0.8608 - accuracy: 0.9982
Epoch 00019: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0020
- dice_coef: 0.8608 - accuracy: 0.9982 - val_loss: 0.0044 -
val_dice_coef: 0.7969 - val_accuracy: 0.9980
Epoch 20/100
37/37 [==============================] - ETA: 0s - loss: 0.0019 -
dice_coef: 0.8646 - accuracy: 0.9982
Epoch 00020: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0019
- dice_coef: 0.8646 - accuracy: 0.9982 - val_loss: 0.0035 -
val_dice_coef: 0.8136 - val_accuracy: 0.9981
Epoch 21/100
37/37 [==============================] - ETA: 0s - loss: 0.0020 -
dice_coef: 0.8606 - accuracy: 0.9982
Epoch 00021: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0020
- dice_coef: 0.8606 - accuracy: 0.9982 - val_loss: 0.0041 -
val_dice_coef: 0.8031 - val_accuracy: 0.9980
Epoch 22/100
37/37 [==============================] - ETA: 0s - loss: 0.0019 -
dice_coef: 0.8667 - accuracy: 0.9982
Epoch 00022: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 294ms/step - loss: 0.0019
- dice_coef: 0.8667 - accuracy: 0.9982 - val_loss: 0.0036 -
val_dice_coef: 0.8098 - val_accuracy: 0.9981
Epoch 23/100
37/37 [==============================] - ETA: 0s - loss: 0.0018 -
dice_coef: 0.8713 - accuracy: 0.9982
Epoch 00023: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0018
- dice_coef: 0.8713 - accuracy: 0.9982 - val_loss: 0.0040 -
val_dice_coef: 0.8021 - val_accuracy: 0.9980
Epoch 24/100
37/37 [==============================] - ETA: 0s - loss: 0.0017 -
dice_coef: 0.8776 - accuracy: 0.9983
Epoch 00024: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0017
- dice_coef: 0.8776 - accuracy: 0.9983 - val_loss: 0.0043 -
val_dice_coef: 0.8012 - val_accuracy: 0.9980
```

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Epoch 25/100
37/37 [==============================] - ETA: 0s - loss: 0.0017 -
dice_coef: 0.8791 - accuracy: 0.9983
Epoch 00025: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 295ms/step - loss: 0.0017
- dice_coef: 0.8791 - accuracy: 0.9983 - val_loss: 0.0041 -
val_dice_coef: 0.8064 - val_accuracy: 0.9980
Epoch 26/100
37/37 [==============================] - ETA: 0s - loss: 0.0017 -
dice_coef: 0.8782 - accuracy: 0.9983
Epoch 00026: val_loss did not improve from 0.00345
37/37 [==============================] - 11s 296ms/step - loss: 0.0017
- dice_coef: 0.8782 - accuracy: 0.9983 - val_loss: 0.0047 -
val_dice_coef: 0.8090 - val_accuracy: 0.9981
Epoch 27/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8843 - accuracy: 0.9983
Epoch 00027: val_loss improved from 0.00345 to 0.00331, saving model to
model3_best.h5
37/37 [==============================] - 12s 330ms/step - loss: 0.0016
- dice_coef: 0.8843 - accuracy: 0.9983 - val_loss: 0.0033 -
val_dice_coef: 0.8302 - val_accuracy: 0.9981
Epoch 28/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8854 - accuracy: 0.9983
Epoch 00028: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 296ms/step - loss: 0.0016
- dice_coef: 0.8854 - accuracy: 0.9983 - val_loss: 0.0038 -
val_dice_coef: 0.8095 - val_accuracy: 0.9980
Epoch 29/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8894 - accuracy: 0.9983
Epoch 00029: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 296ms/step - loss: 0.0016
- dice_coef: 0.8894 - accuracy: 0.9983 - val_loss: 0.0044 -
val_dice_coef: 0.8037 - val_accuracy: 0.9980
Epoch 30/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8903 - accuracy: 0.9983
Epoch 00030: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0016
- dice_coef: 0.8903 - accuracy: 0.9983 - val_loss: 0.0045 -
val_dice_coef: 0.8108 - val_accuracy: 0.9981
Epoch 31/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8896 - accuracy: 0.9983
Epoch 00031: val_loss did not improve from 0.00331
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37/37 [==============================] - 11s 295ms/step - loss: 0.0015
- dice_coef: 0.8896 - accuracy: 0.9983 - val_loss: 0.0045 -
val_dice_coef: 0.8281 - val_accuracy: 0.9981
Epoch 32/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8906 - accuracy: 0.9983
Epoch 00032: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0015
- dice_coef: 0.8906 - accuracy: 0.9983 - val_loss: 0.0046 -
val_dice_coef: 0.8151 - val_accuracy: 0.9980
Epoch 33/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8959 - accuracy: 0.9983
Epoch 00033: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0015
- dice_coef: 0.8959 - accuracy: 0.9983 - val_loss: 0.0046 -
val_dice_coef: 0.8224 - val_accuracy: 0.9981
Epoch 34/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8969 - accuracy: 0.9983
Epoch 00034: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0015
- dice_coef: 0.8969 - accuracy: 0.9983 - val_loss: 0.0044 -
val_dice_coef: 0.8220 - val_accuracy: 0.9981
Epoch 35/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8996 - accuracy: 0.9983
Epoch 00035: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.8996 - accuracy: 0.9983 - val_loss: 0.0054 -
val_dice_coef: 0.8191 - val_accuracy: 0.9981
Epoch 36/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8989 - accuracy: 0.9983
Epoch 00036: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.8989 - accuracy: 0.9983 - val_loss: 0.0051 -
val_dice_coef: 0.8209 - val_accuracy: 0.9981
Epoch 37/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8979 - accuracy: 0.9983
Epoch 00037: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 296ms/step - loss: 0.0014
- dice_coef: 0.8979 - accuracy: 0.9983 - val_loss: 0.0046 -
val_dice_coef: 0.8228 - val_accuracy: 0.9981
Epoch 38/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8933 - accuracy: 0.9983
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Epoch 00038: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.8933 - accuracy: 0.9983 - val_loss: 0.0043 -
val_dice_coef: 0.8269 - val_accuracy: 0.9981
Epoch 39/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8973 - accuracy: 0.9983
Epoch 00039: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 296ms/step - loss: 0.0014
- dice_coef: 0.8973 - accuracy: 0.9983 - val_loss: 0.0059 -
val_dice_coef: 0.8237 - val_accuracy: 0.9981
Epoch 40/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.9014 - accuracy: 0.9983
Epoch 00040: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.9014 - accuracy: 0.9983 - val_loss: 0.0046 -
val_dice_coef: 0.8159 - val_accuracy: 0.9980
Epoch 41/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.8985 - accuracy: 0.9983
Epoch 00041: val_loss did not improve from 0.00331
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.8985 - accuracy: 0.9983 - val_loss: 0.0050 -
val_dice_coef: 0.8211 - val_accuracy: 0.9981
Epoch 42/100
37/37 [==============================] - ETA: 0s - loss: 0.0016 -
dice_coef: 0.8898 - accuracy: 0.9983
Epoch 00042: val_loss improved from 0.00331 to 0.00288, saving model to
model3_best.h5
37/37 [==============================] - 12s 330ms/step - loss: 0.0016
- dice_coef: 0.8898 - accuracy: 0.9983 - val_loss: 0.0029 -
val_dice_coef: 0.8311 - val_accuracy: 0.9981
Epoch 43/100
37/37 [==============================] - ETA: 0s - loss: 0.0015 -
dice_coef: 0.8945 - accuracy: 0.9983
Epoch 00043: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0015
- dice_coef: 0.8945 - accuracy: 0.9983 - val_loss: 0.0045 -
val_dice_coef: 0.8245 - val_accuracy: 0.9981
Epoch 44/100
37/37 [==============================] - ETA: 0s - loss: 0.0014 -
dice_coef: 0.9009 - accuracy: 0.9983
Epoch 00044: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0014
- dice_coef: 0.9009 - accuracy: 0.9983 - val_loss: 0.0045 -
val_dice_coef: 0.8235 - val_accuracy: 0.9981
Epoch 45/100
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37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9044 - accuracy: 0.9983
Epoch 00045: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9044 - accuracy: 0.9983 - val_loss: 0.0048 -
val_dice_coef: 0.8275 - val_accuracy: 0.9981
Epoch 46/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9061 - accuracy: 0.9983
Epoch 00046: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9061 - accuracy: 0.9983 - val_loss: 0.0043 -
val_dice_coef: 0.8263 - val_accuracy: 0.9981
Epoch 47/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9047 - accuracy: 0.9983
Epoch 00047: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9047 - accuracy: 0.9983 - val_loss: 0.0042 -
val_dice_coef: 0.8308 - val_accuracy: 0.9981
Epoch 48/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9056 - accuracy: 0.9983
Epoch 00048: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9056 - accuracy: 0.9983 - val_loss: 0.0045 -
val_dice_coef: 0.8255 - val_accuracy: 0.9981
Epoch 49/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9060 - accuracy: 0.9983
Epoch 00049: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9060 - accuracy: 0.9983 - val_loss: 0.0055 -
val_dice_coef: 0.8228 - val_accuracy: 0.9980
Epoch 50/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9058 - accuracy: 0.9983
Epoch 00050: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9058 - accuracy: 0.9983 - val_loss: 0.0055 -
val_dice_coef: 0.8257 - val_accuracy: 0.9981
Epoch 51/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9085 - accuracy: 0.9984
Epoch 00051: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9085 - accuracy: 0.9984 - val_loss: 0.0047 -
val_dice_coef: 0.8261 - val_accuracy: 0.9981
```

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Epoch 52/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9073 - accuracy: 0.9984
Epoch 00052: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9073 - accuracy: 0.9984 - val_loss: 0.0048 -
val_dice_coef: 0.8277 - val_accuracy: 0.9981
Epoch 53/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9080 - accuracy: 0.9984
Epoch 00053: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0013
- dice_coef: 0.9080 - accuracy: 0.9984 - val_loss: 0.0045 -
val_dice_coef: 0.8314 - val_accuracy: 0.9981
Epoch 54/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9085 - accuracy: 0.9984
Epoch 00054: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 297ms/step - loss: 0.0013
- dice_coef: 0.9085 - accuracy: 0.9984 - val_loss: 0.0055 -
val_dice_coef: 0.8258 - val_accuracy: 0.9981
Epoch 55/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9104 - accuracy: 0.9984
Epoch 00055: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9104 - accuracy: 0.9984 - val_loss: 0.0054 -
val_dice_coef: 0.8289 - val_accuracy: 0.9981
Epoch 56/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9116 - accuracy: 0.9984
Epoch 00056: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9116 - accuracy: 0.9984 - val_loss: 0.0042 -
val_dice_coef: 0.8341 - val_accuracy: 0.9981
Epoch 57/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9090 - accuracy: 0.9984
Epoch 00057: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9090 - accuracy: 0.9984 - val_loss: 0.0047 -
val_dice_coef: 0.8291 - val_accuracy: 0.9981
Epoch 58/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9095 - accuracy: 0.9984
Epoch 00058: val_loss did not improve from 0.00288
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37/37 [==============================] - 11s 297ms/step - loss: 0.0012
- dice_coef: 0.9095 - accuracy: 0.9984 - val_loss: 0.0066 -
val_dice_coef: 0.8112 - val_accuracy: 0.9980
Epoch 59/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9111 - accuracy: 0.9984
Epoch 00059: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9111 - accuracy: 0.9984 - val_loss: 0.0057 -
val_dice_coef: 0.8252 - val_accuracy: 0.9981
Epoch 60/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9087 - accuracy: 0.9984
Epoch 00060: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9087 - accuracy: 0.9984 - val_loss: 0.0053 -
val_dice_coef: 0.8284 - val_accuracy: 0.9981
Epoch 61/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9080 - accuracy: 0.9984
Epoch 00061: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9080 - accuracy: 0.9984 - val_loss: 0.0050 -
val_dice_coef: 0.8259 - val_accuracy: 0.9981
Epoch 62/100
37/37 [==============================] - ETA: 0s - loss: 0.0013 -
dice_coef: 0.9078 - accuracy: 0.9984
Epoch 00062: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0013
- dice_coef: 0.9078 - accuracy: 0.9984 - val_loss: 0.0057 -
val_dice_coef: 0.8244 - val_accuracy: 0.9981
Epoch 63/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9124 - accuracy: 0.9984
Epoch 00063: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9124 - accuracy: 0.9984 - val_loss: 0.0043 -
val_dice_coef: 0.8319 - val_accuracy: 0.9981
Epoch 64/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9114 - accuracy: 0.9984
Epoch 00064: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9114 - accuracy: 0.9984 - val_loss: 0.0045 -
val_dice_coef: 0.8316 - val_accuracy: 0.9981
Epoch 65/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9135 - accuracy: 0.9984
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Epoch 00065: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9135 - accuracy: 0.9984 - val_loss: 0.0045 -
val_dice_coef: 0.8309 - val_accuracy: 0.9981
Epoch 66/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9122 - accuracy: 0.9984
Epoch 00066: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9122 - accuracy: 0.9984 - val_loss: 0.0060 -
val_dice_coef: 0.8195 - val_accuracy: 0.9981
Epoch 67/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9140 - accuracy: 0.9984
Epoch 00067: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9140 - accuracy: 0.9984 - val_loss: 0.0051 -
val_dice_coef: 0.8319 - val_accuracy: 0.9981
Epoch 68/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9143 - accuracy: 0.9984
Epoch 00068: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9143 - accuracy: 0.9984 - val_loss: 0.0053 -
val_dice_coef: 0.8309 - val_accuracy: 0.9981
Epoch 69/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9138 - accuracy: 0.9984
Epoch 00069: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9138 - accuracy: 0.9984 - val_loss: 0.0045 -
val_dice_coef: 0.8343 - val_accuracy: 0.9981
Epoch 70/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9155 - accuracy: 0.9984
Epoch 00070: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9155 - accuracy: 0.9984 - val_loss: 0.0056 -
val_dice_coef: 0.8280 - val_accuracy: 0.9981
Epoch 71/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9148 - accuracy: 0.9984
Epoch 00071: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9148 - accuracy: 0.9984 - val_loss: 0.0070 -
val_dice_coef: 0.8235 - val_accuracy: 0.9981
Epoch 72/100
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37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9155 - accuracy: 0.9984
Epoch 00072: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9155 - accuracy: 0.9984 - val_loss: 0.0058 -
val_dice_coef: 0.8305 - val_accuracy: 0.9981
Epoch 73/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9160 - accuracy: 0.9984
Epoch 00073: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9160 - accuracy: 0.9984 - val_loss: 0.0062 -
val_dice_coef: 0.8255 - val_accuracy: 0.9981
Epoch 74/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9129 - accuracy: 0.9984
Epoch 00074: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9129 - accuracy: 0.9984 - val_loss: 0.0053 -
val_dice_coef: 0.8320 - val_accuracy: 0.9981
Epoch 75/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9141 - accuracy: 0.9984
Epoch 00075: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9141 - accuracy: 0.9984 - val_loss: 0.0057 -
val_dice_coef: 0.8281 - val_accuracy: 0.9981
Epoch 76/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9139 - accuracy: 0.9984
Epoch 00076: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9139 - accuracy: 0.9984 - val_loss: 0.0058 -
val_dice_coef: 0.8280 - val_accuracy: 0.9981
Epoch 77/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9149 - accuracy: 0.9984
Epoch 00077: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9149 - accuracy: 0.9984 - val_loss: 0.0048 -
val_dice_coef: 0.8325 - val_accuracy: 0.9981
Epoch 78/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9149 - accuracy: 0.9984
Epoch 00078: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9149 - accuracy: 0.9984 - val_loss: 0.0055 -
val_dice_coef: 0.8292 - val_accuracy: 0.9981
```

```
Epoch 79/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9163 - accuracy: 0.9984
Epoch 00079: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9163 - accuracy: 0.9984 - val_loss: 0.0058 -
val_dice_coef: 0.8284 - val_accuracy: 0.9981
Epoch 80/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9166 - accuracy: 0.9984
Epoch 00080: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9166 - accuracy: 0.9984 - val_loss: 0.0056 -
val_dice_coef: 0.8318 - val_accuracy: 0.9981
Epoch 81/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9161 - accuracy: 0.9984
Epoch 00081: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9161 - accuracy: 0.9984 - val_loss: 0.0061 -
val_dice_coef: 0.8322 - val_accuracy: 0.9981
Epoch 82/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9154 - accuracy: 0.9984
Epoch 00082: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 297ms/step - loss: 0.0012
- dice_coef: 0.9154 - accuracy: 0.9984 - val_loss: 0.0056 -
val_dice_coef: 0.8327 - val_accuracy: 0.9981
Epoch 83/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9172 - accuracy: 0.9984
Epoch 00083: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0012
- dice_coef: 0.9172 - accuracy: 0.9984 - val_loss: 0.0053 -
val_dice_coef: 0.8353 - val_accuracy: 0.9981
Epoch 84/100
37/37 [==============================] - ETA: 0s - loss: 0.0012 -
dice_coef: 0.9164 - accuracy: 0.9984
Epoch 00084: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0012
- dice_coef: 0.9164 - accuracy: 0.9984 - val_loss: 0.0060 -
val_dice_coef: 0.8307 - val_accuracy: 0.9981
Epoch 85/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9166 - accuracy: 0.9984
Epoch 00085: val_loss did not improve from 0.00288
```

```
37/37 [==============================] - 11s 295ms/step - loss: 0.0011
- dice_coef: 0.9166 - accuracy: 0.9984 - val_loss: 0.0072 -
val_dice_coef: 0.8186 - val_accuracy: 0.9981
Epoch 86/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9178 - accuracy: 0.9984
Epoch 00086: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 297ms/step - loss: 0.0011
- dice_coef: 0.9178 - accuracy: 0.9984 - val_loss: 0.0054 -
val_dice_coef: 0.8345 - val_accuracy: 0.9981
Epoch 87/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9181 - accuracy: 0.9984
Epoch 00087: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9181 - accuracy: 0.9984 - val_loss: 0.0064 -
val_dice_coef: 0.8294 - val_accuracy: 0.9981
Epoch 88/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9188 - accuracy: 0.9984
Epoch 00088: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9188 - accuracy: 0.9984 - val_loss: 0.0055 -
val_dice_coef: 0.8329 - val_accuracy: 0.9981
Epoch 89/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9168 - accuracy: 0.9984
Epoch 00089: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9168 - accuracy: 0.9984 - val_loss: 0.0065 -
val_dice_coef: 0.8319 - val_accuracy: 0.9981
Epoch 90/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9176 - accuracy: 0.9984
Epoch 00090: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9176 - accuracy: 0.9984 - val_loss: 0.0067 -
val_dice_coef: 0.8247 - val_accuracy: 0.9981
Epoch 91/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9187 - accuracy: 0.9984
Epoch 00091: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9187 - accuracy: 0.9984 - val_loss: 0.0076 -
val_dice_coef: 0.8240 - val_accuracy: 0.9981
Epoch 92/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9195 - accuracy: 0.9984
```

```
Epoch 00092: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0011
- dice_coef: 0.9195 - accuracy: 0.9984 - val_loss: 0.0061 -
val_dice_coef: 0.8354 - val_accuracy: 0.9981
Epoch 93/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9192 - accuracy: 0.9984
Epoch 00093: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9192 - accuracy: 0.9984 - val_loss: 0.0058 -
val_dice_coef: 0.8321 - val_accuracy: 0.9981
Epoch 94/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9185 - accuracy: 0.9984
Epoch 00094: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9185 - accuracy: 0.9984 - val_loss: 0.0062 -
val_dice_coef: 0.8309 - val_accuracy: 0.9981
Epoch 95/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9189 - accuracy: 0.9984
Epoch 00095: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9189 - accuracy: 0.9984 - val_loss: 0.0060 -
val_dice_coef: 0.8335 - val_accuracy: 0.9981
Epoch 96/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9204 - accuracy: 0.9984
Epoch 00096: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9204 - accuracy: 0.9984 - val_loss: 0.0060 -
val_dice_coef: 0.8322 - val_accuracy: 0.9981
Epoch 97/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9197 - accuracy: 0.9984
Epoch 00097: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0011
- dice_coef: 0.9197 - accuracy: 0.9984 - val_loss: 0.0061 -
val_dice_coef: 0.8332 - val_accuracy: 0.9981
Epoch 98/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9192 - accuracy: 0.9984
Epoch 00098: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9192 - accuracy: 0.9984 - val_loss: 0.0061 -
val_dice_coef: 0.8337 - val_accuracy: 0.9981
Epoch 99/100
```
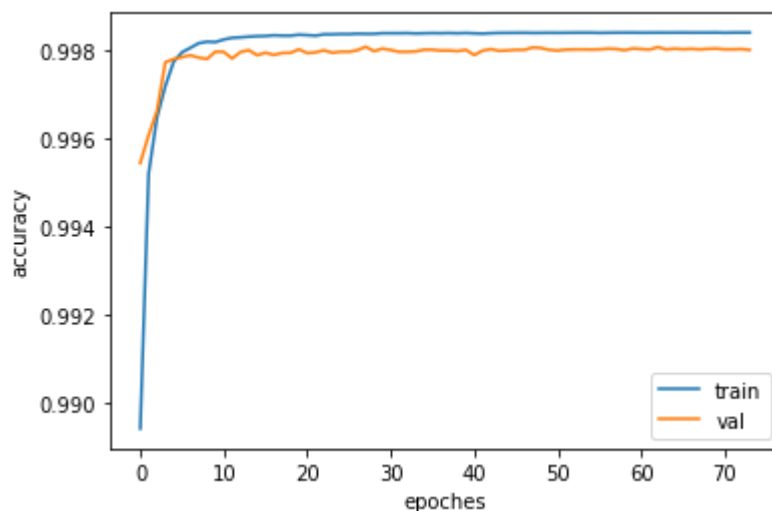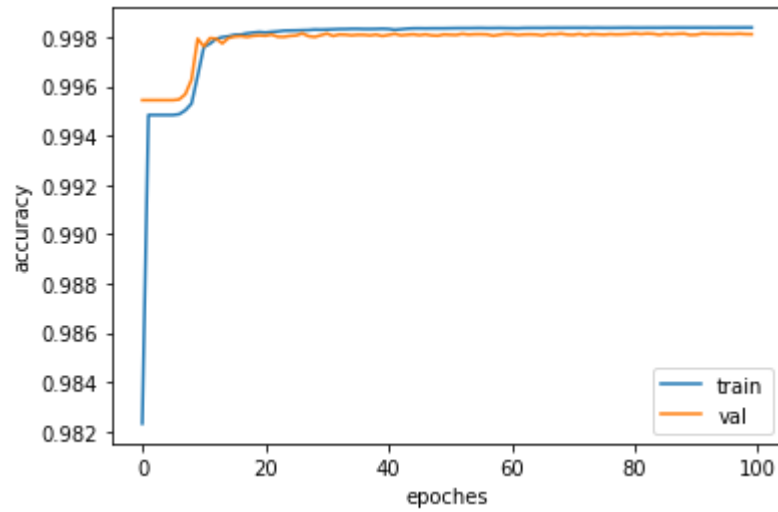
```
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9198 - accuracy: 0.9984
Epoch 00099: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 296ms/step - loss: 0.0011
- dice_coef: 0.9198 - accuracy: 0.9984 - val_loss: 0.0069 -
val_dice_coef: 0.8285 - val_accuracy: 0.9981
Epoch 100/100
37/37 [==============================] - ETA: 0s - loss: 0.0011 -
dice_coef: 0.9195 - accuracy: 0.9984
Epoch 00100: val_loss did not improve from 0.00288
37/37 [==============================] - 11s 295ms/step - loss: 0.0011
- dice_coef: 0.9195 - accuracy: 0.9984 - val_loss: 0.0070 -
val_dice_coef: 0.8266 - val_accuracy: 0.9981
```

4. Hyperparameters:

- **Batch size : 32**
- **Optimizer : Adam optimizer**
- **Learning rate : 0.001**
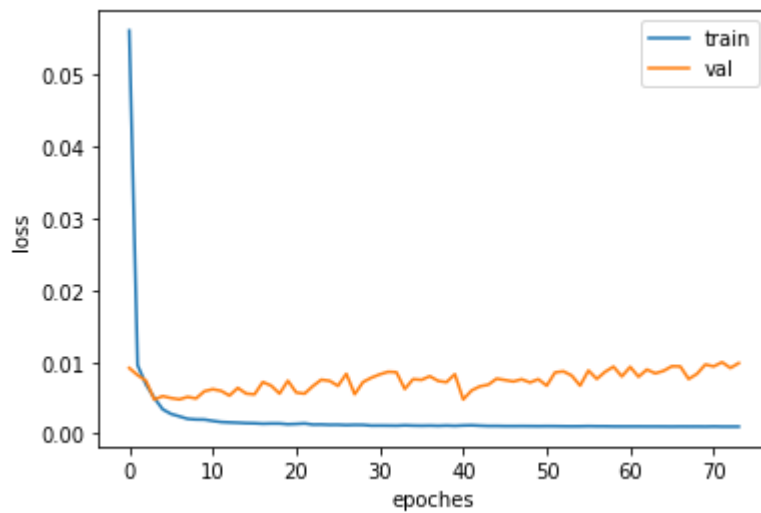- **Activation Function : Relu**

5. Accuracy Curve

a) uNet_4

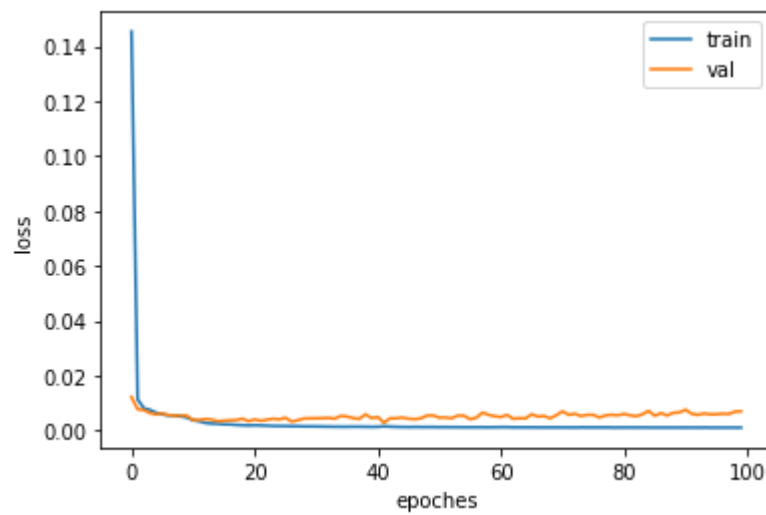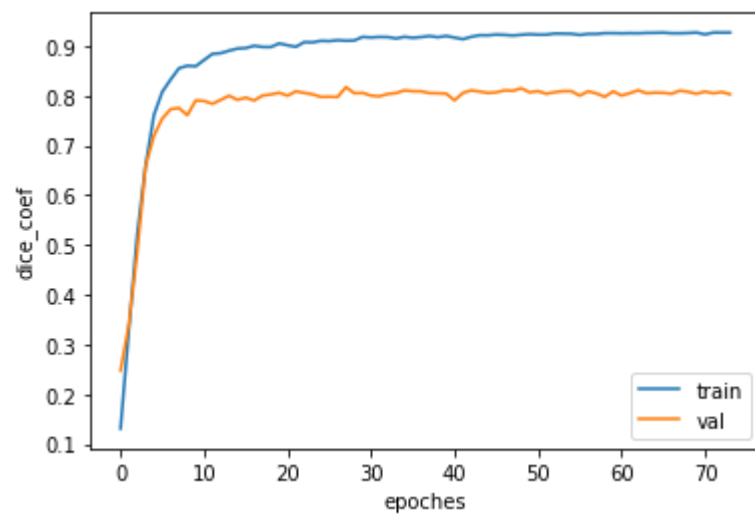## b) uNet_5

6. Loss Curve
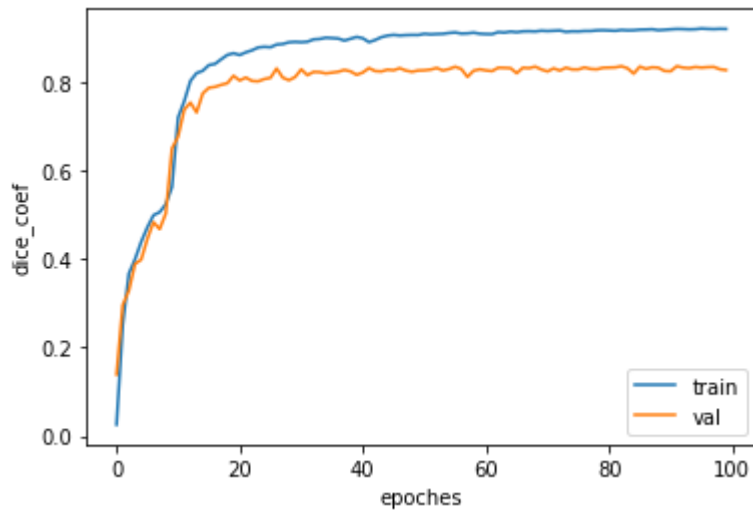
a) uNet_4

b) uNet_5

7. Dice_curve

a) uNet_4

b) uNet_5

9. Observation

a) uNet_4

```
Test dc: 0.735011663485716
Test pre: 0.8917885760494009
Test re: 0.6251159435226219
```

b) uNet_5

```
Test dc: 0.7596579724409449
Test pre: 0.9422401953303831
Test re: 0.6363495826033185
```

As we can see above the result of uNet_4 and uNet_5 , the uNet_5 performs better than uNet_4

10. Conclusion

We have successfully implemented model uNet_4 and uNet_5 on a given dataset (Task2) and uNet_5 outperforms uNet_4.