W-Net Modified Architecture

Parameters

```
Model: "model"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
Connected to
=================================================================
input_1 (InputLayer)         [(None, 128, 128, 3)      0
_________________________________________________________________
lambda (Lambda)              (None, 128, 128, 3)       0
input_1[0][0]
_________________________________________________________________
conv2d (Conv2D)              (None, 128, 128, 32)      896
lambda[0][0]
_________________________________________________________________
dropout (Dropout)            (None, 128, 128, 32)      0
conv2d[0][0]
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 128, 128, 32)      9248
dropout[0][0]
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 64, 64, 32)        0
conv2d_1[0][0]
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 64, 64, 64)        18496
max_pooling2d[0][0]
_________________________________________________________________
dropout_1 (Dropout)          (None, 64, 64, 64)        0
conv2d_2[0][0]
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 64, 64, 64)        36928
dropout_1[0][0]
_________________________________________________________________
max_pooling2d_1 (MaxPooling2D) (None, 32, 32, 64)      0
conv2d_3[0][0]
_________________________________________________________________
conv2d_4 (Conv2D)            (None, 32, 32, 128)       73856
max_pooling2d_1[0][0]
_________________________________________________________________
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dropout_2 (Dropout)             (None, 32, 32, 128)  0
conv2d_4[0][0]
__________________________________________________________________________________________________
conv2d_5 (Conv2D)               (None, 32, 32, 128)  147584
dropout_2[0][0]
__________________________________________________________________________________________________
max_pooling2d_2 (MaxPooling2D)  (None, 16, 16, 128)  0
conv2d_5[0][0]
__________________________________________________________________________________________________
conv2d_6 (Conv2D)               (None, 16, 16, 256)  295168
max_pooling2d_2[0][0]
__________________________________________________________________________________________________
dropout_3 (Dropout)             (None, 16, 16, 256)  0
conv2d_6[0][0]
__________________________________________________________________________________________________
conv2d_7 (Conv2D)               (None, 16, 16, 256)  590080
dropout_3[0][0]
__________________________________________________________________________________________________
conv2d_transpose (Conv2DTranspo (None, 32, 32, 128)  131200
conv2d_7[0][0]
__________________________________________________________________________________________________
concatenate (Concatenate)       (None, 32, 32, 256)  0
conv2d_transpose[0][0]

conv2d_5[0][0]
__________________________________________________________________________________________________
conv2d_8 (Conv2D)               (None, 32, 32, 128)  295040
concatenate[0][0]
__________________________________________________________________________________________________
dropout_4 (Dropout)             (None, 32, 32, 128)  0
conv2d_8[0][0]
__________________________________________________________________________________________________
conv2d_9 (Conv2D)               (None, 32, 32, 128)  147584
dropout_4[0][0]
__________________________________________________________________________________________________
conv2d_transpose_1 (Conv2DTrans (None, 64, 64, 64)   32832
conv2d_9[0][0]
__________________________________________________________________________________________________
concatenate_1 (Concatenate)     (None, 64, 64, 128)  0
conv2d_transpose_1[0][0]

conv2d_3[0][0]
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__________________________________________________________________________________________________
__________________________
conv2d_10 (Conv2D)              (None, 64, 64, 64)   73792
concatenate_1[0][0]
__________________________________________________________________________________________________
__________________________
dropout_5 (Dropout)             (None, 64, 64, 64)   0
conv2d_10[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_11 (Conv2D)              (None, 64, 64, 64)   36928
dropout_5[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_transpose_2 (Conv2DTrans (None, 128, 128, 32) 8224
conv2d_11[0][0]
__________________________________________________________________________________________________
__________________________
concatenate_2 (Concatenate)     (None, 128, 128, 64) 0
conv2d_transpose_2[0][0]

conv2d_1[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_12 (Conv2D)              (None, 128, 128, 32) 18464
concatenate_2[0][0]
__________________________________________________________________________________________________
__________________________
dropout_6 (Dropout)             (None, 128, 128, 32) 0
conv2d_12[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_13 (Conv2D)              (None, 128, 128, 32) 9248
dropout_6[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_14 (Conv2D)              (None, 128, 128, 32) 9248
conv2d_13[0][0]
__________________________________________________________________________________________________
__________________________
dropout_7 (Dropout)             (None, 128, 128, 32) 0
conv2d_14[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_15 (Conv2D)              (None, 128, 128, 32) 9248
dropout_7[0][0]
__________________________________________________________________________________________________
__________________________
max_pooling2d_3 (MaxPooling2D)  (None, 64, 64, 32)   0
conv2d_15[0][0]
__________________________________________________________________________________________________
__________________________
conv2d_16 (Conv2D)              (None, 64, 64, 64)   18496
max_pooling2d_3[0][0]
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____________________________________________________________________________________________________
dropout_8 (Dropout)             (None, 64, 64, 64)   0
conv2d_16[0][0]
____________________________________________________________________________________________________
conv2d_17 (Conv2D)              (None, 64, 64, 64)   36928
dropout_8[0][0]
____________________________________________________________________________________________________
max_pooling2d_4 (MaxPooling2D)  (None, 32, 32, 64)   0
conv2d_17[0][0]
____________________________________________________________________________________________________
conv2d_18 (Conv2D)              (None, 32, 32, 128)  73856
max_pooling2d_4[0][0]
____________________________________________________________________________________________________
dropout_9 (Dropout)             (None, 32, 32, 128)  0
conv2d_18[0][0]
____________________________________________________________________________________________________
conv2d_19 (Conv2D)              (None, 32, 32, 128)  147584
dropout_9[0][0]
____________________________________________________________________________________________________
max_pooling2d_5 (MaxPooling2D)  (None, 16, 16, 128)  0
conv2d_19[0][0]
____________________________________________________________________________________________________
conv2d_20 (Conv2D)              (None, 16, 16, 256)  295168
max_pooling2d_5[0][0]
____________________________________________________________________________________________________
dropout_10 (Dropout)            (None, 16, 16, 256)  0
conv2d_20[0][0]
____________________________________________________________________________________________________
conv2d_21 (Conv2D)              (None, 16, 16, 256)  590080
dropout_10[0][0]
____________________________________________________________________________________________________
conv2d_transpose_3 (Conv2DTrans (None, 32, 32, 128)  131200
conv2d_21[0][0]
____________________________________________________________________________________________________
concatenate_3 (Concatenate)     (None, 32, 32, 256)  0
conv2d_transpose_3[0][0]

conv2d_19[0][0]
____________________________________________________________________________________________________
conv2d_22 (Conv2D)              (None, 32, 32, 128)  295040
concatenate_3[0][0]
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____________________________________________________________________________________________
____________________
dropout_11 (Dropout)            (None, 32, 32, 128)  0
conv2d_22[0][0]
____________________________________________________________________________________________
____________________
conv2d_23 (Conv2D)              (None, 32, 32, 128)  147584
dropout_11[0][0]
____________________________________________________________________________________________
____________________
conv2d_transpose_4 (Conv2DTrans (None, 64, 64, 64)   32832
conv2d_23[0][0]
____________________________________________________________________________________________
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concatenate_4 (Concatenate)     (None, 64, 64, 128)  0
conv2d_transpose_4[0][0]

conv2d_17[0][0]
____________________________________________________________________________________________
____________________
conv2d_24 (Conv2D)              (None, 64, 64, 64)   73792
concatenate_4[0][0]
____________________________________________________________________________________________
____________________
dropout_12 (Dropout)            (None, 64, 64, 64)   0
conv2d_24[0][0]
____________________________________________________________________________________________
____________________
conv2d_25 (Conv2D)              (None, 64, 64, 64)   36928
dropout_12[0][0]
____________________________________________________________________________________________
____________________
conv2d_transpose_5 (Conv2DTrans (None, 128, 128, 32) 8224
conv2d_25[0][0]
____________________________________________________________________________________________
____________________
concatenate_5 (Concatenate)     (None, 128, 128, 64) 0
conv2d_transpose_5[0][0]

conv2d_15[0][0]
____________________________________________________________________________________________
____________________
conv2d_26 (Conv2D)              (None, 128, 128, 32) 18464
concatenate_5[0][0]
____________________________________________________________________________________________
____________________
dropout_13 (Dropout)            (None, 128, 128, 32) 0
conv2d_26[0][0]
____________________________________________________________________________________________
____________________
conv2d_27 (Conv2D)              (None, 128, 128, 32) 9248
dropout_13[0][0]
____________________________________________________________________________________________
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conv2d_28 (Conv2D)              (None, 128, 128, 1)  33
conv2d_27[0][0]
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Total params: 3,859,521
Trainable params: 3,859,521
Non-trainable params: 0
__________________________________________________________________________________
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```

Outcome

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Epoch 1/30
7/7 [==============================] - 39s 741ms/step - loss: 0.7028 -
accuracy: 0.6896 - val_loss: 0.6150 - val_accuracy: 0.7627
Epoch 2/30
7/7 [==============================] - 1s 123ms/step - loss: 0.6215 -
accuracy: 0.7964 - val_loss: 0.5797 - val_accuracy: 0.7627
Epoch 3/30
7/7 [==============================] - 1s 124ms/step - loss: 0.5852 -
accuracy: 0.7964 - val_loss: 0.5437 - val_accuracy: 0.7627
Epoch 4/30
7/7 [==============================] - 1s 124ms/step - loss: 0.5048 -
accuracy: 0.7964 - val_loss: 0.4742 - val_accuracy: 0.7627
Epoch 5/30
7/7 [==============================] - 1s 124ms/step - loss: 0.3946 -
accuracy: 0.7964 - val_loss: 0.4394 - val_accuracy: 0.7627
Epoch 6/30
7/7 [==============================] - 1s 123ms/step - loss: 0.3376 -
accuracy: 0.7964 - val_loss: 0.4693 - val_accuracy: 0.7627
Epoch 7/30
7/7 [==============================] - 1s 124ms/step - loss: 0.2977 -
accuracy: 0.8068 - val_loss: 0.2963 - val_accuracy: 0.8599
Epoch 8/30
7/7 [==============================] - 1s 124ms/step - loss: 0.2257 -
accuracy: 0.9128 - val_loss: 0.3286 - val_accuracy: 0.8866
Epoch 9/30
7/7 [==============================] - 1s 125ms/step - loss: 0.1960 -
accuracy: 0.9294 - val_loss: 0.2103 - val_accuracy: 0.9208
Epoch 10/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1985 -
accuracy: 0.9234 - val_loss: 0.2772 - val_accuracy: 0.9083
Epoch 11/30
7/7 [==============================] - 1s 125ms/step - loss: 0.2123 -
accuracy: 0.9225 - val_loss: 0.1982 - val_accuracy: 0.9282
Epoch 12/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1744 -
accuracy: 0.9346 - val_loss: 0.1574 - val_accuracy: 0.9401
Epoch 13/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1554 -
accuracy: 0.9433 - val_loss: 0.1368 - val_accuracy: 0.9475
Epoch 14/30
7/7 [==============================] - 1s 125ms/step - loss: 0.1347 -
accuracy: 0.9491 - val_loss: 0.1335 - val_accuracy: 0.9492
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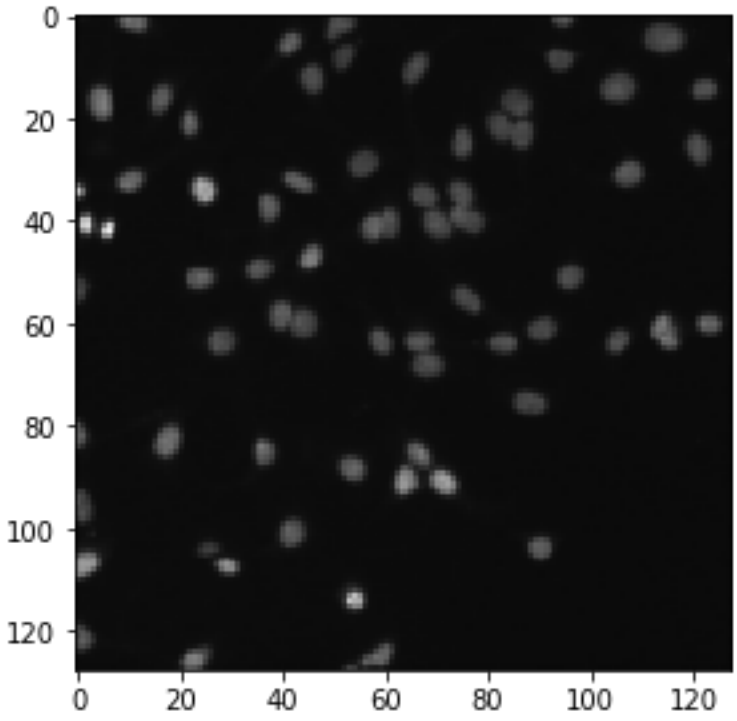
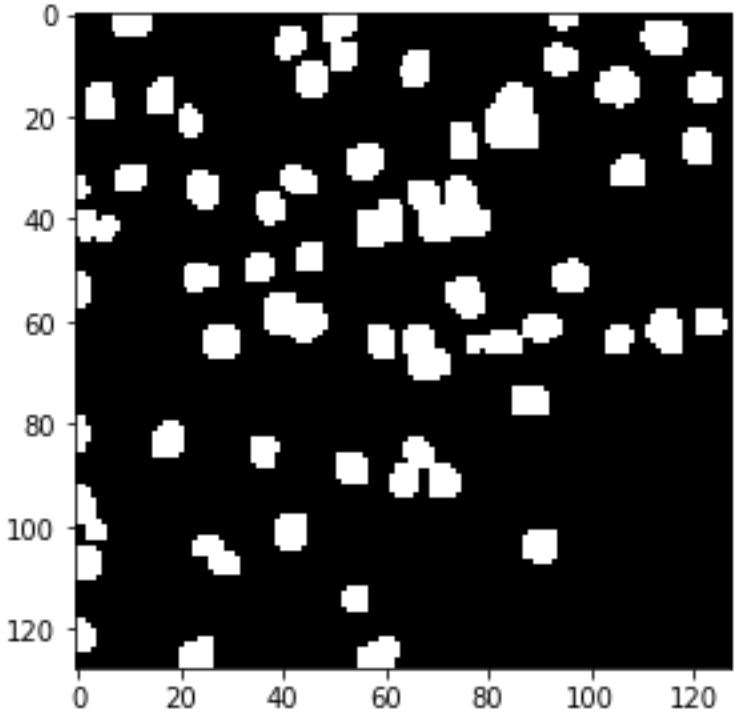
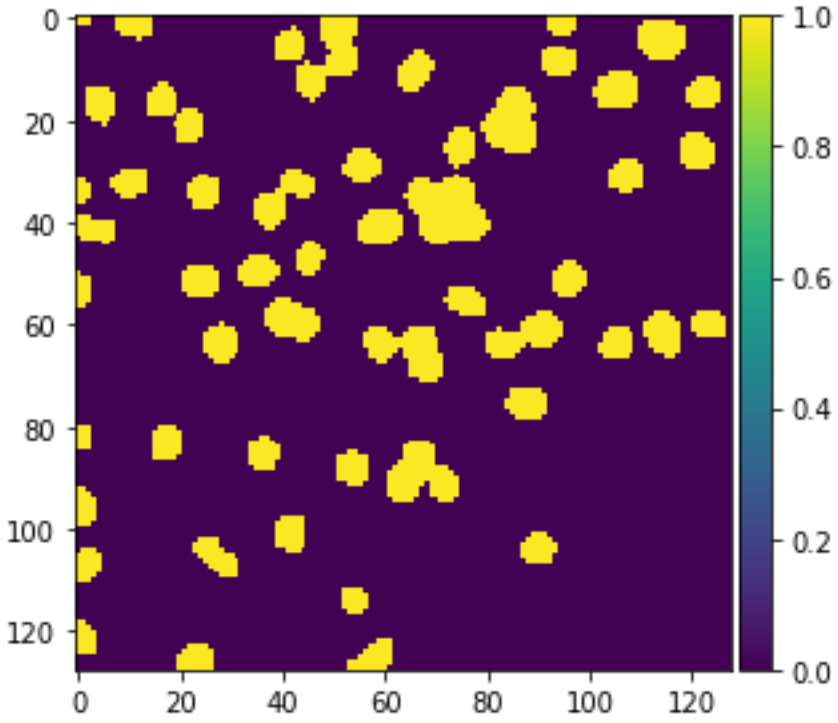
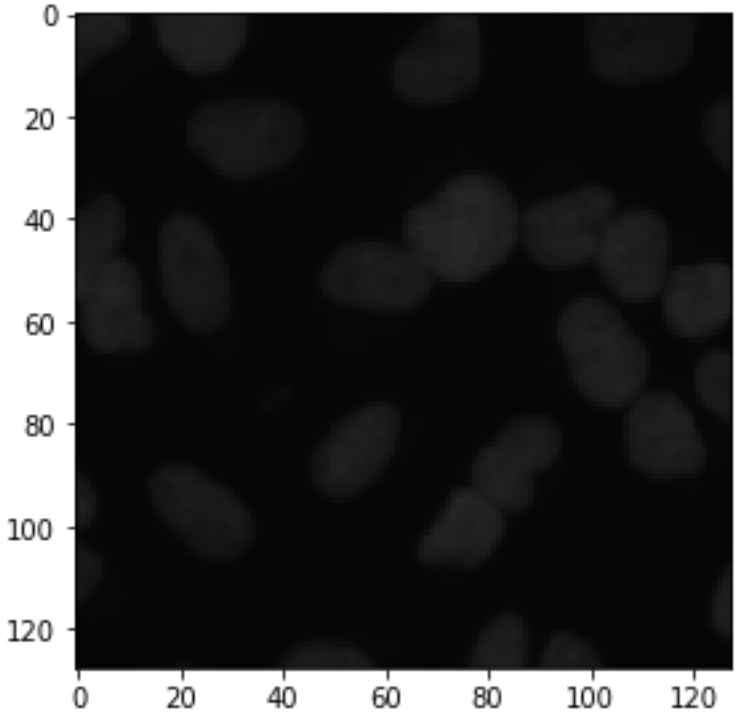
Epoch 15/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1216 -
accuracy: 0.9534 - val_loss: 0.1350 - val_accuracy: 0.9480
Epoch 16/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1159 -
accuracy: 0.9555 - val_loss: 0.1201 - val_accuracy: 0.9536
Epoch 17/30
7/7 [==============================] - 1s 132ms/step - loss: 0.1241 -
accuracy: 0.9515 - val_loss: 0.1264 - val_accuracy: 0.9494
Epoch 18/30
7/7 [==============================] - 1s 125ms/step - loss: 0.1102 -
accuracy: 0.9578 - val_loss: 0.1169 - val_accuracy: 0.9535
Epoch 19/30
7/7 [==============================] - 1s 131ms/step - loss: 0.1052 -
accuracy: 0.9604 - val_loss: 0.1134 - val_accuracy: 0.9562
Epoch 20/30
7/7 [==============================] - 1s 124ms/step - loss: 0.1136 -
accuracy: 0.9579 - val_loss: 0.1896 - val_accuracy: 0.9311
Epoch 21/30
7/7 [==============================] - 1s 126ms/step - loss: 0.1219 -
accuracy: 0.9551 - val_loss: 0.1408 - val_accuracy: 0.9439
Epoch 22/30
7/7 [==============================] - 1s 128ms/step - loss: 0.1064 -
accuracy: 0.9585 - val_loss: 0.1126 - val_accuracy: 0.9566
Epoch 23/30
7/7 [==============================] - 1s 127ms/step - loss: 0.1010 -
accuracy: 0.9614 - val_loss: 0.1039 - val_accuracy: 0.9593
Epoch 24/30
7/7 [==============================] - 1s 126ms/step - loss: 0.0947 -
accuracy: 0.9634 - val_loss: 0.1122 - val_accuracy: 0.9571
Epoch 25/30
7/7 [==============================] - 1s 126ms/step - loss: 0.0923 -
accuracy: 0.9639 - val_loss: 0.1015 - val_accuracy: 0.9598
Epoch 26/30
7/7 [==============================] - 1s 133ms/step - loss: 0.0908 -
accuracy: 0.9645 - val_loss: 0.0985 - val_accuracy: 0.9607
Epoch 27/30
7/7 [==============================] - 1s 125ms/step - loss: 0.0916 -
accuracy: 0.9644 - val_loss: 0.1032 - val_accuracy: 0.9598
Epoch 28/30
7/7 [==============================] - 1s 132ms/step - loss: 0.0881 -
accuracy: 0.9655 - val_loss: 0.0965 - val_accuracy: 0.9613
Epoch 29/30
7/7 [==============================] - 1s 126ms/step - loss: 0.0883 -
accuracy: 0.9653 - val_loss: 0.0945 - val_accuracy: 0.9614
Epoch 30/30
7/7 [==============================] - 1s 127ms/step - loss: 0.0866 -
accuracy: 0.9652 - val_loss: 0.0994 - val_accuracy: 0.9603
4/4 [==============================] - 2s 42ms/step
1/1 [==============================] - 0s 15ms/step
3/3 [==============================] - 1s 251ms/step
```

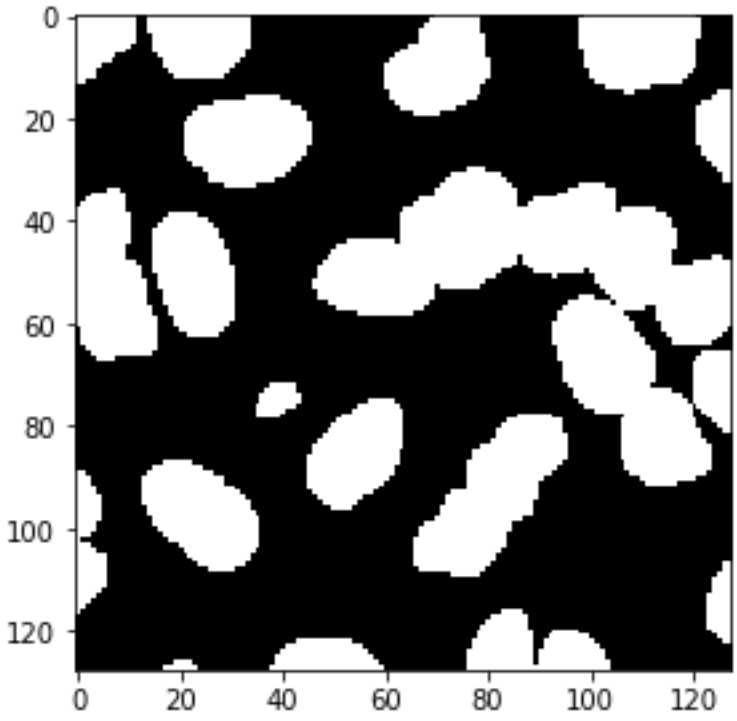


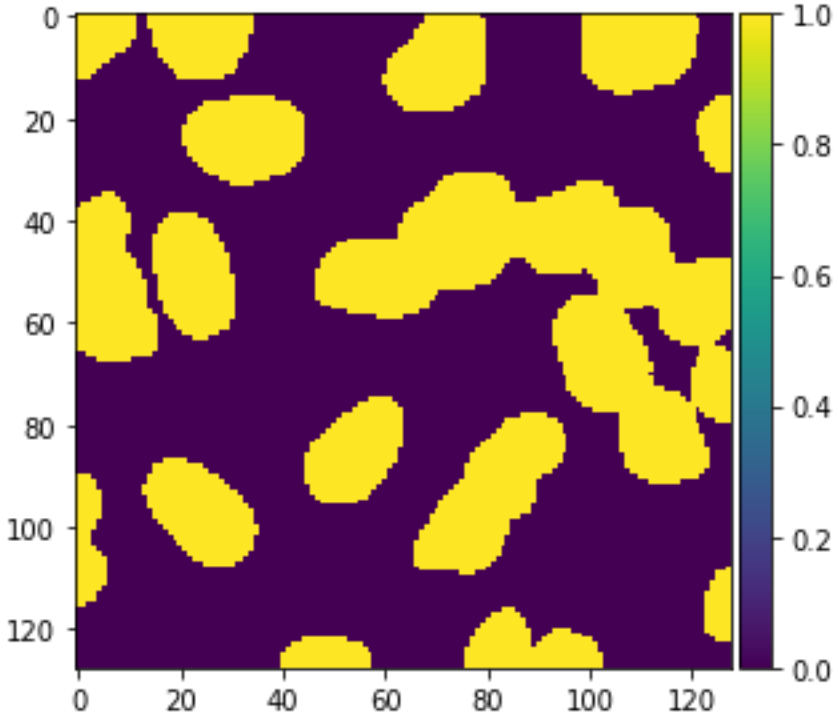



```
/usr/local/lib/python3.7/dist-
packages/skimage/io/_plugins/matplotlib_plugin.py:150: UserWarning: Low image
data range; displaying image with stretched contrast.
  lo, hi, cmap = _get_display_range(image)
```


0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0


0
20
40
60
80
100
120


0
20
40
60
80
100
120
0
20
40
60
80
100
120


0
20
40
60
80
100
120
0
20
40
60
80
100
120
1.0
0.8
0.6
0.4
0.2
0.0