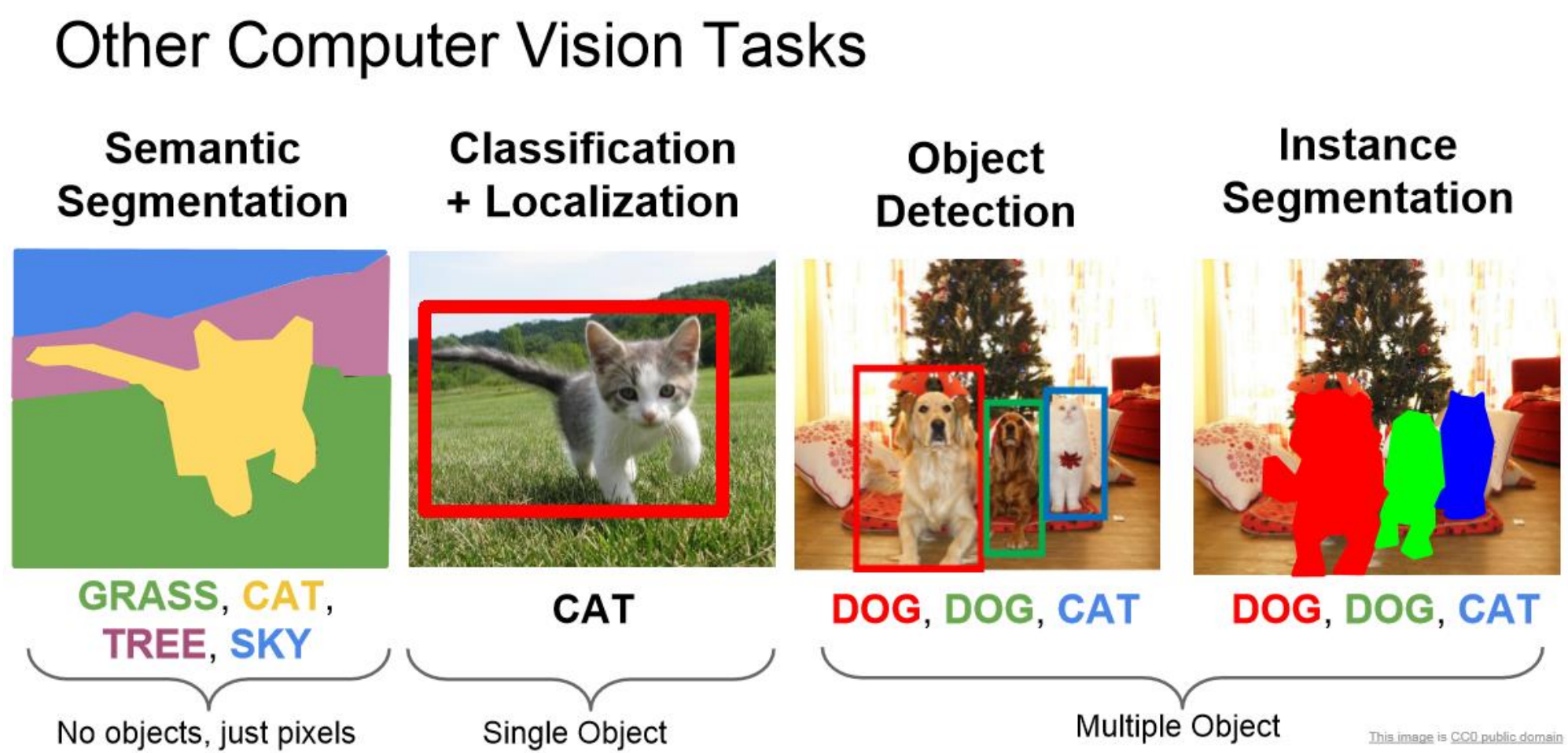
Experiment of Fully Convolutional Network

James Hsu

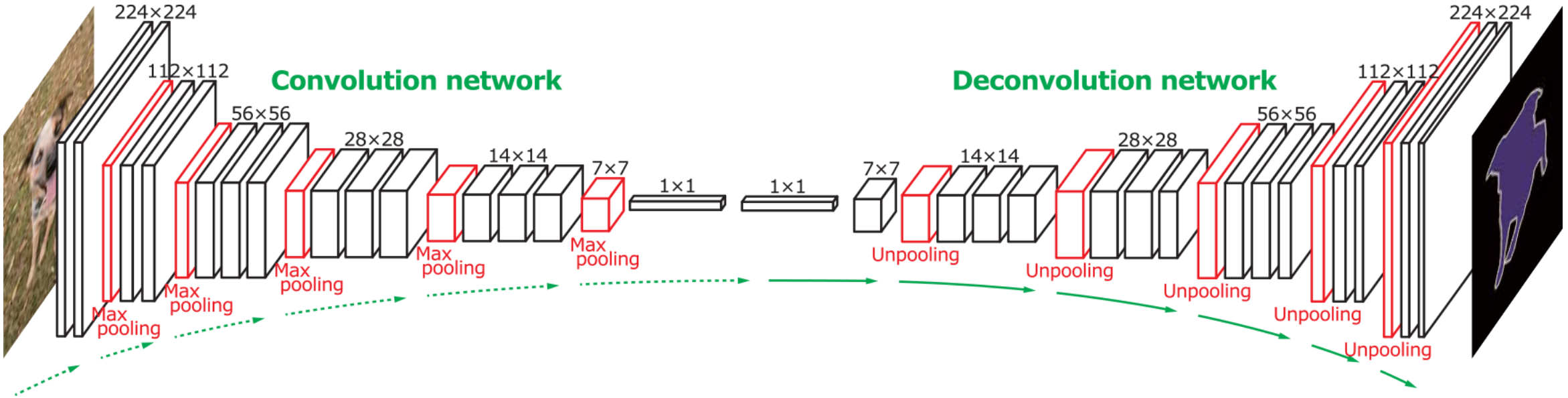
Semantic Segmentation

- Image segmentation is the process of classifying each pixel in an image belonging to a certain class
  - **Semantic segmentation**: The process of classifying each pixel belonging to a particular label. It doesn't different across different instances of the same object
  - **Instance segmentation** : Instance segmentation differs from semantic segmentation in the sense that it gives a unique label to every instance of a particular object in the image.

Semantic Segmentation



Introduction



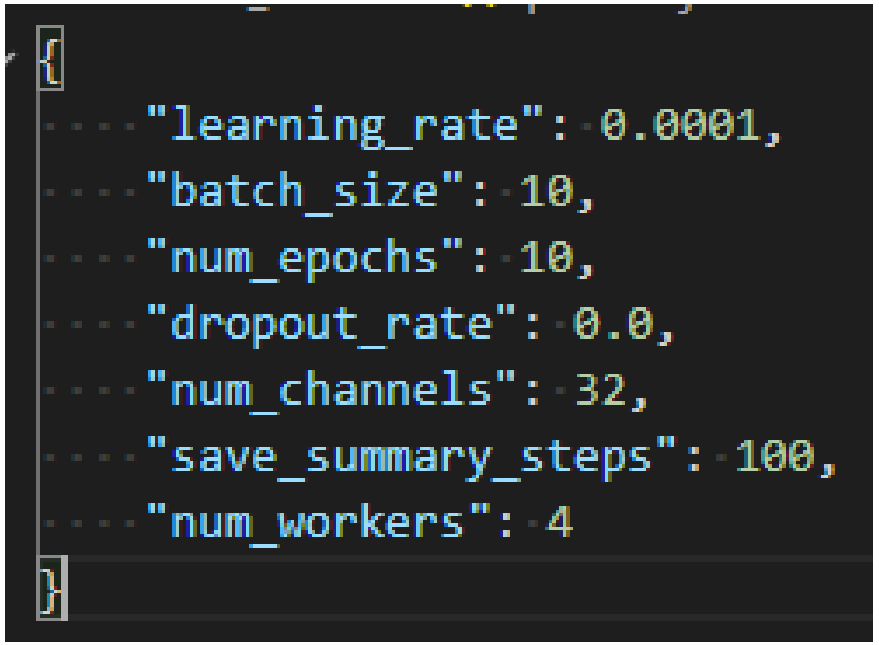
Experiment

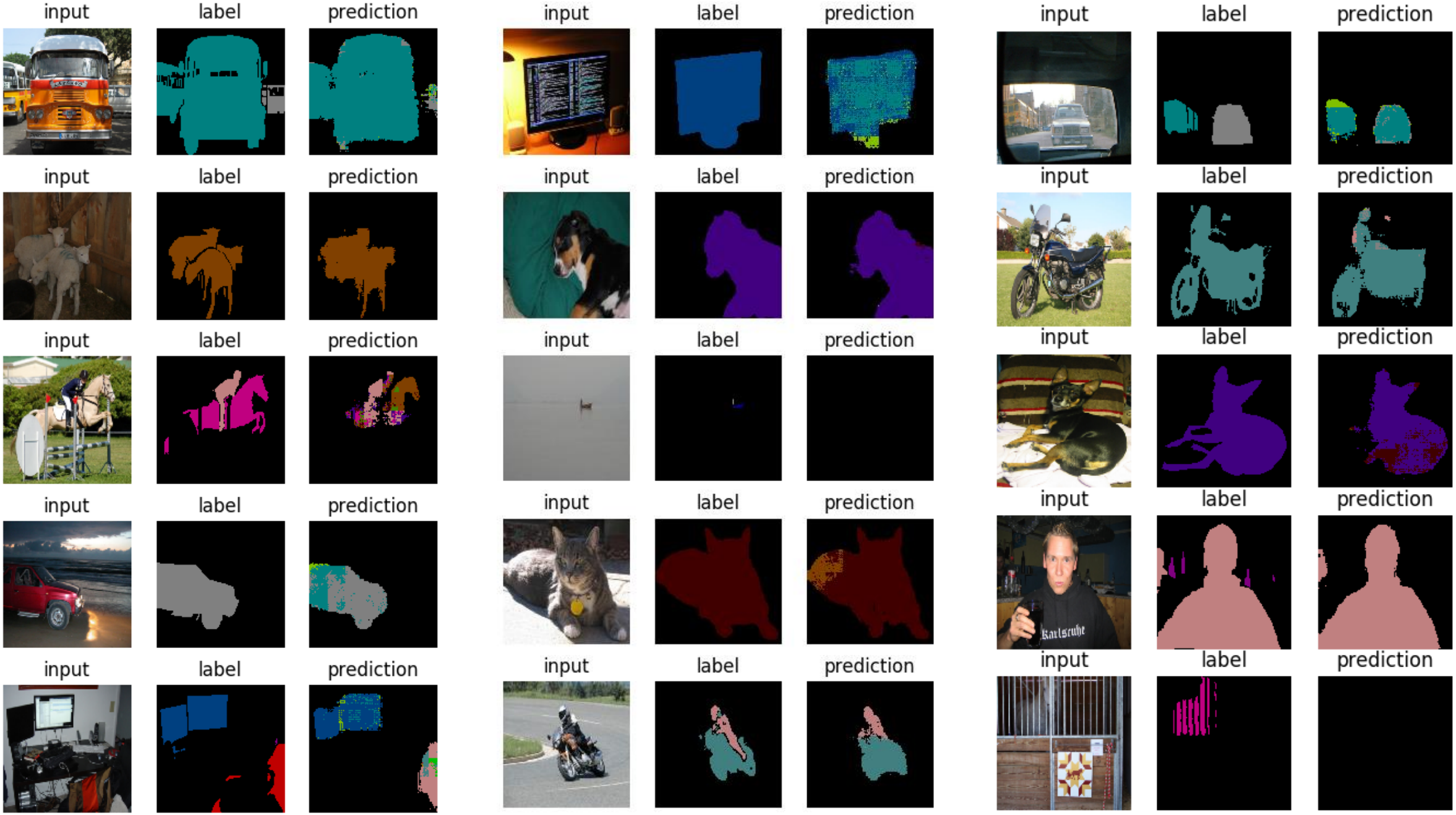
Architecture

```
(base) D:\jameshsu\Experiment\FCN>python model\net.py
----------------------------------------------------------------
       Layer (type)               Output Shape         Param #
================================================================
            Conv2d-1         [-1, 64, 224, 224]           1,792
              ReLU-2         [-1, 64, 224, 224]               0
            Conv2d-3         [-1, 64, 224, 224]          36,928
              ReLU-4         [-1, 64, 224, 224]               0
         MaxPool2d-5         [-1, 64, 112, 112]               0
            Conv2d-6        [-1, 128, 112, 112]          73,856
              ReLU-7        [-1, 128, 112, 112]               0
            Conv2d-8        [-1, 128, 112, 112]         147,584
              ReLU-9        [-1, 128, 112, 112]               0
        MaxPool2d-10          [-1, 128, 56, 56]               0
           Conv2d-11          [-1, 256, 56, 56]         295,168
             ReLU-12          [-1, 256, 56, 56]               0
           Conv2d-13          [-1, 256, 56, 56]         590,080
             ReLU-14          [-1, 256, 56, 56]               0
           Conv2d-15          [-1, 256, 56, 56]         590,080
             ReLU-16          [-1, 256, 56, 56]               0
        MaxPool2d-17          [-1, 256, 28, 28]               0
           Conv2d-18          [-1, 512, 28, 28]       1,180,160
             ReLU-19          [-1, 512, 28, 28]               0
           Conv2d-20          [-1, 512, 28, 28]       2,359,808
             ReLU-21          [-1, 512, 28, 28]               0
           Conv2d-22          [-1, 512, 28, 28]       2,359,808
             ReLU-23          [-1, 512, 28, 28]               0
        MaxPool2d-24          [-1, 512, 14, 14]               0
           Conv2d-25          [-1, 512, 14, 14]       2,359,808
             ReLU-26          [-1, 512, 14, 14]               0
           Conv2d-27          [-1, 512, 14, 14]       2,359,808
             ReLU-28          [-1, 512, 14, 14]               0
           Conv2d-29          [-1, 512, 14, 14]       2,359,808
             ReLU-30          [-1, 512, 14, 14]               0
        MaxPool2d-31            [-1, 512, 7, 7]               0
```

```
  ConvTranspose2d-33          [-1, 512, 14, 14]       1,049,088
      BatchNorm2d-34          [-1, 512, 14, 14]           1,024
             ReLU-35          [-1, 512, 14, 14]               0
       UpSampling-36          [-1, 512, 14, 14]               0
  ConvTranspose2d-37          [-1, 256, 28, 28]         524,544
      BatchNorm2d-38          [-1, 256, 28, 28]             512
             ReLU-39          [-1, 256, 28, 28]               0
       UpSampling-40          [-1, 256, 28, 28]               0
  ConvTranspose2d-41          [-1, 128, 56, 56]         131,200
      BatchNorm2d-42          [-1, 128, 56, 56]             256
             ReLU-43          [-1, 128, 56, 56]               0
       UpSampling-44          [-1, 128, 56, 56]               0
  ConvTranspose2d-45          [-1, 64, 112, 112]         32,832
      BatchNorm2d-46          [-1, 64, 112, 112]            128
             ReLU-47          [-1, 64, 112, 112]              0
       UpSampling-48          [-1, 64, 112, 112]              0
  ConvTranspose2d-49          [-1, 32, 224, 224]          8,224
      BatchNorm2d-50          [-1, 32, 224, 224]             64
           Conv2d-51          [-1, 21, 224, 224]            693
================================================================
Total params: 16,463,253
Trainable params: 16,463,253
Non-trainable params: 0
----------------------------------------------------------------
Input size (MB): 0.57
Forward/backward pass size (MB): 296.87
```

Parameters


{
"learning_rate": 0.0001,
"batch_size": 10,
"num_epochs": 10,
"dropout_rate": 0.0,
"num_channels": 32,
"save_summary_steps": 100,
"num_workers": 4
}


input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction
input
label
prediction

Metrics

- mIOU: 0.322%