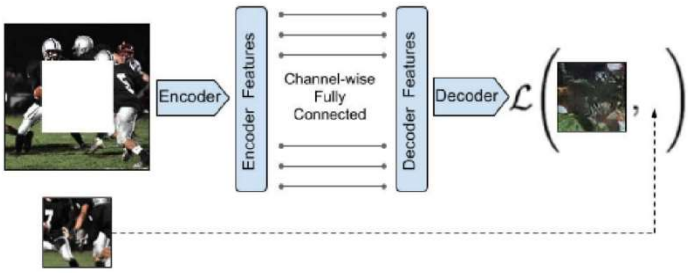
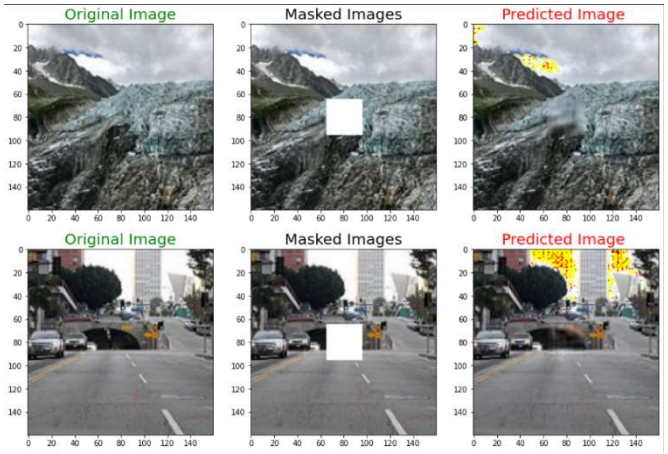
Image Inpainting

Given an image with a missing region, we train a convolutional neural network to regress to the missing pixel values We call our model context encoder, as it consists of an encoder capturing the context of an image into a compact latent feature representation and a decoder which uses that representation to produce the missing image content. The context encoder is closely related to autoencoders, as it shares a similar encoder-decoder architecture. Autoencoders take an input image and try to reconstruct it after it passes through a low-dimensional “bottleneck” layer, with the aim of obtaining a compact feature representation of the scene.



Results



Generator Model

```
__________________________________________________________________________________________________
 Layer (type)                   Output Shape         Param #     Connected to
==================================================================================================
 input_1 (InputLayer)           [(None, 160, 160, 3  0           []
                                )]

 sequential (Sequential)        (None, 80, 80, 128)  3584        ['input_1[0][0]']

 sequential_1 (Sequential)      (None, 40, 40, 128)  147584      ['sequential[0][0]']

 sequential_2 (Sequential)      (None, 20, 20, 256)  296192      ['sequential_1[0][0]']

 sequential_3 (Sequential)      (None, 10, 10, 512)  1182208     ['sequential_2[0][0]']

 sequential_4 (Sequential)      (None, 5, 5, 512)    2361856     ['sequential_3[0][0]']

 sequential_5 (Sequential)      (None, 10, 10, 512)  2359808     ['sequential_4[0][0]']

 concatenate (Concatenate)      (None, 10, 10, 1024  0           ['sequential_5[0][0]',
                                )                                 'sequential_3[0][0]']

 sequential_6 (Sequential)      (None, 20, 20, 256)  2359552     ['concatenate[0][0]']

 concatenate_1 (Concatenate)    (None, 20, 20, 512)  0           ['sequential_6[0][0]',
                                                                  'sequential_2[0][0]']

 sequential_7 (Sequential)      (None, 40, 40, 128)  589952      ['concatenate_1[0][0]']

 concatenate_2 (Concatenate)    (None, 40, 40, 256)  0           ['sequential_7[0][0]',
                                                                  'sequential_1[0][0]']

 sequential_8 (Sequential)      (None, 80, 80, 128)  295040      ['concatenate_2[0][0]']

 concatenate_3 (Concatenate)    (None, 80, 80, 256)  0           ['sequential_8[0][0]',
                                                                  'sequential[0][0]']

 sequential_9 (Sequential)      (None, 160, 160, 3)  6915        ['concatenate_3[0][0]']

 concatenate_4 (Concatenate)    (None, 160, 160, 6)  0           ['sequential_9[0][0]',
                                                                  'input_1[0][0]']

 conv2d_5 (Conv2D)              (None, 160, 160, 3)  75          ['concatenate_4[0][0]']

==================================================================================================
Total params: 9,602,766
Trainable params: 9,600,206
Non-trainable params: 2,560
__________________________________________________________________________________________________
```

Discriminator Model

```
Layer (type)                Output Shape              Param #
=================================================================
 input_2 (InputLayer)        [(None, 160, 160, 3)]     0

 sequential_10 (Sequential)  (None, 80, 80, 128)       3584

 sequential_11 (Sequential)  (None, 40, 40, 256)       296192

 sequential_12 (Sequential)  (None, 20, 20, 512)       1182208

 sequential_13 (Sequential)  (None, 10, 10, 512)       2361856
```

```
 flatten (Flatten)           (None, 51200)             0

 dense (Dense)               (None, 1)                 51201

=================================================================
Total params: 3,895,041
Trainable params: 3,892,481
Non-trainable params: 2,560
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```

Combined Model of the Above

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 Layer (type)                Output Shape              Param #
=================================================================
 input_6 (InputLayer)        [(None, 160, 160, 3)]     0

 model (Functional)          (None, 160, 160, 3)       9602766

 model_3 (Functional)        (None, 1)                 3895041

=================================================================
Total params: 13,497,807
Trainable params: 9,600,206
Non-trainable params: 3,897,601
_________________________________________________________________
```