

ID: 21-45856-3

Name: Wasibur Rahman Chowdhury Alvi

First we have to calculate output sizes at each layer.

Input = $64 \times 64 \times 3$

Convolutional layer 1:

Filter: 8

Filter Size: 3×3

Stride: 1

Padding: same

output size: $64 \times 64 \times 8$

Convolutional layer 2:

Input: $64 \times 64 \times 8$

Filter: 32

Filter size: 3×3

Stride: 2

Padding: none.

$$\frac{n-f}{s} + 1 \Rightarrow \frac{64-3}{2} + 1 \Rightarrow 31$$

output: $31 \times 31 \times 32$

Max Pooling layer:

Input: $31 \times 31 \times 32$

Filter size: 2×2

Stride : 2

$$\frac{n - f}{s} + 1 \Rightarrow \frac{31 - 2}{2} + 1$$

Output size : $15 \times 15 \times 32$

Fully Connected layer:

Input size : $15 \times 15 \times 32$

Output with 10 neurons = $(15 \times 15 \times 32) \times 10$
= 72000

a) weight matrix required to represent

Layer 1 = 8 filters.

Layer 2 = 32 filters.

Fully Connected = 1 weight matrix

Total = $8 + 32 + 1 = 41$

c) Trainable Parameters.

Convolution layer 1: Input : $64 \times 64 \times 3$

Filter : $3 \times 3 \times 3$

Filter : 8

Bias : 8

Total = $(3 \times 3 \times 3 \times 8) + 8 \Rightarrow 224$

layer 2:

Input: $64 \times 64 \times 8$

Filters: 32

Size: $3 \times 3 \times 8$

Bias: 32

Total: $(3 \times 3 \times 8 \times 32) + 32$
 $\Rightarrow 2304$

Connected layer:

Input: $15 \times 15 \times 32$

neuron = 10

bias = 10

total = $(15 \times 15 \times 32 \times 10) + 10$

$\Rightarrow 72010$

total = $224 + 2336 + 72,010 = 74570$

\Rightarrow Total trainable Parameters = 74570.

b) Dimensions at each weight matrix

layer 1 = $3 \times 3 \times 3 \times 8$

layer 2 = $3 \times 3 \times 8 \times 32$

Connected layer = 7200×10