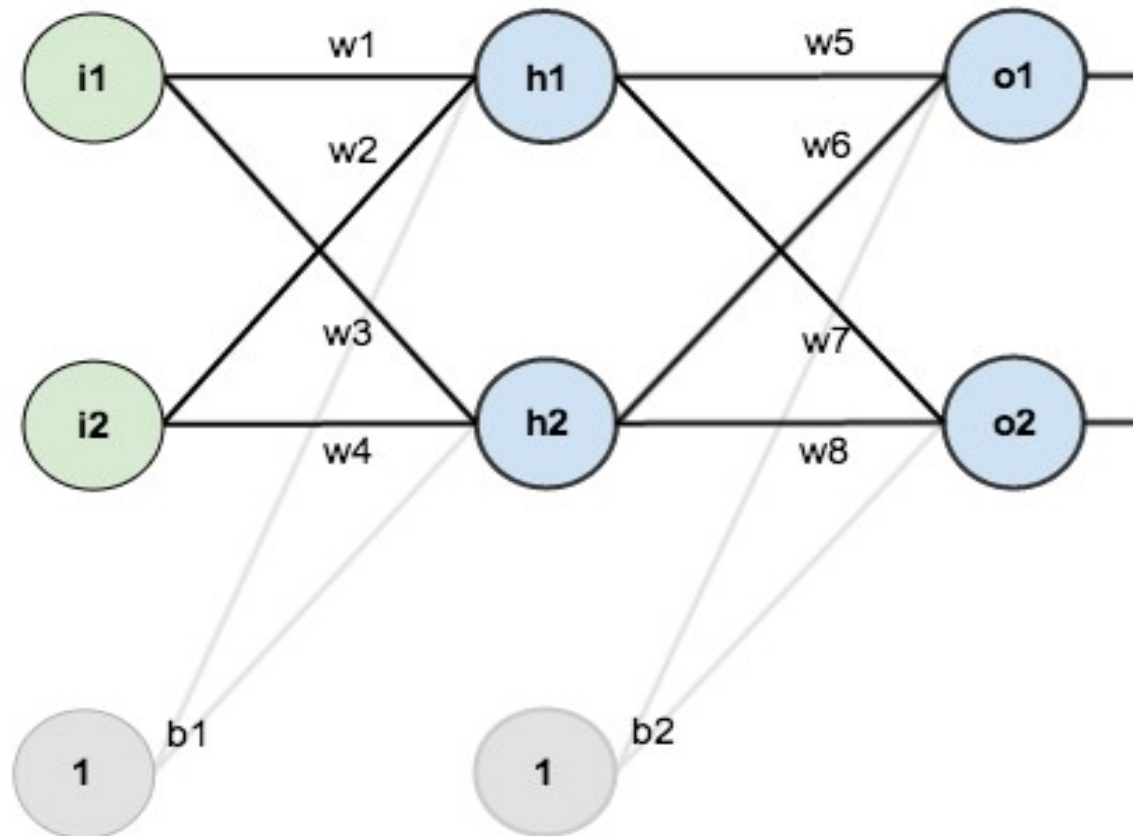


# Neurónové siete

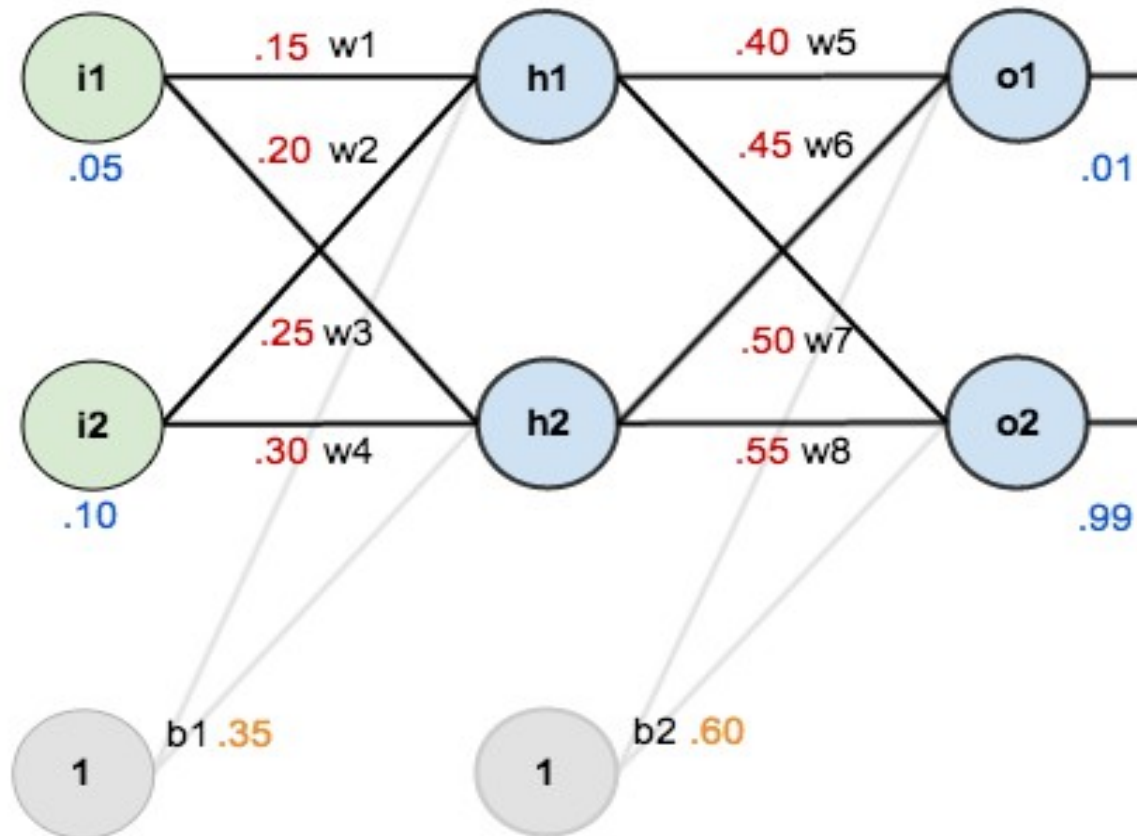
Cvičenia z Počítačového Videnia 2

Zuzana Haladová

# Backpropagation



# Backpropagation

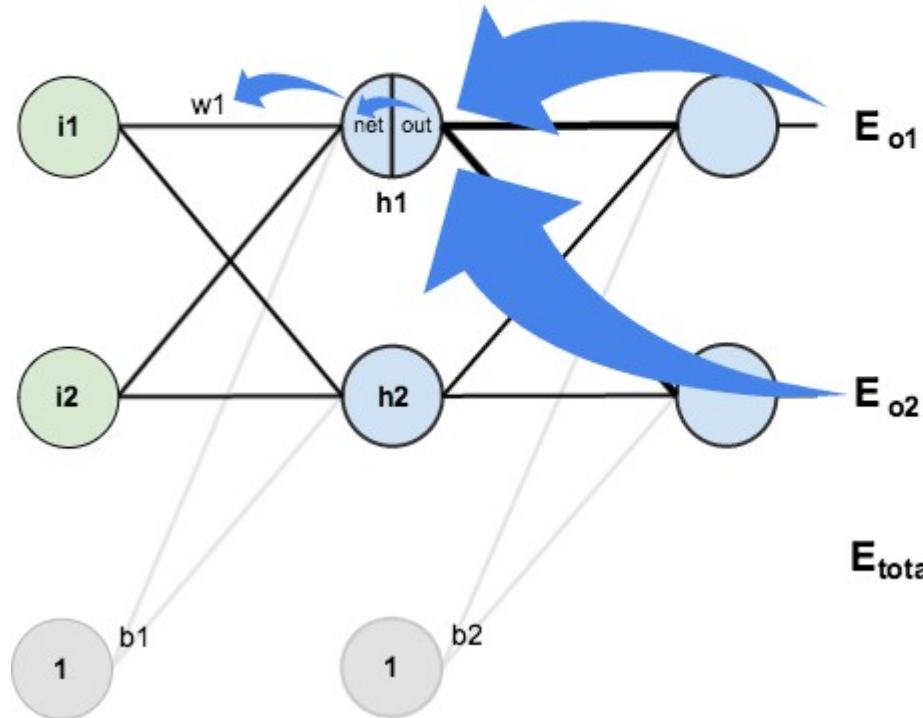


# Backpropagation

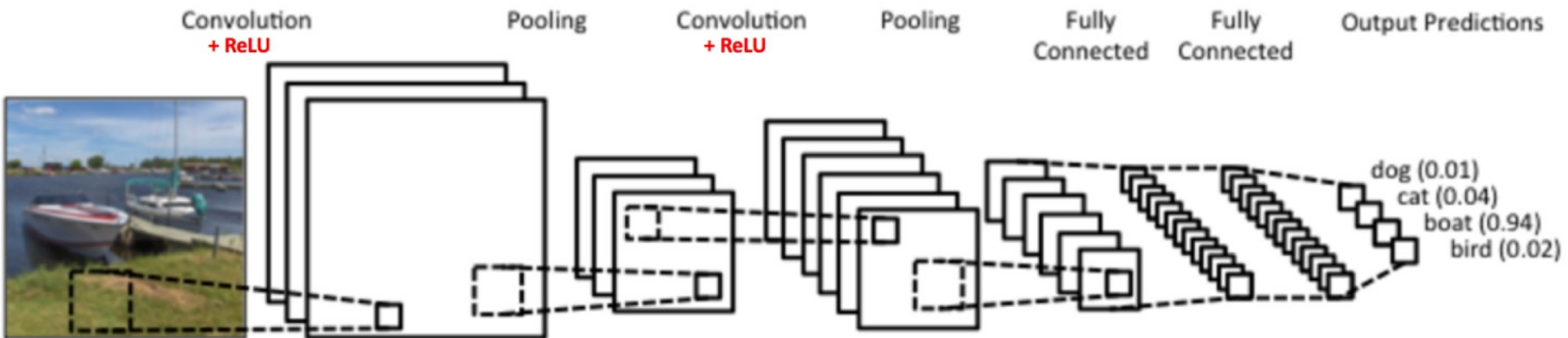
$$\frac{\partial E_{total}}{\partial w_1} = \frac{\partial E_{total}}{\partial out_{h1}} * \frac{\partial out_{h1}}{\partial net_{h1}} * \frac{\partial net_{h1}}{\partial w_1}$$

↓

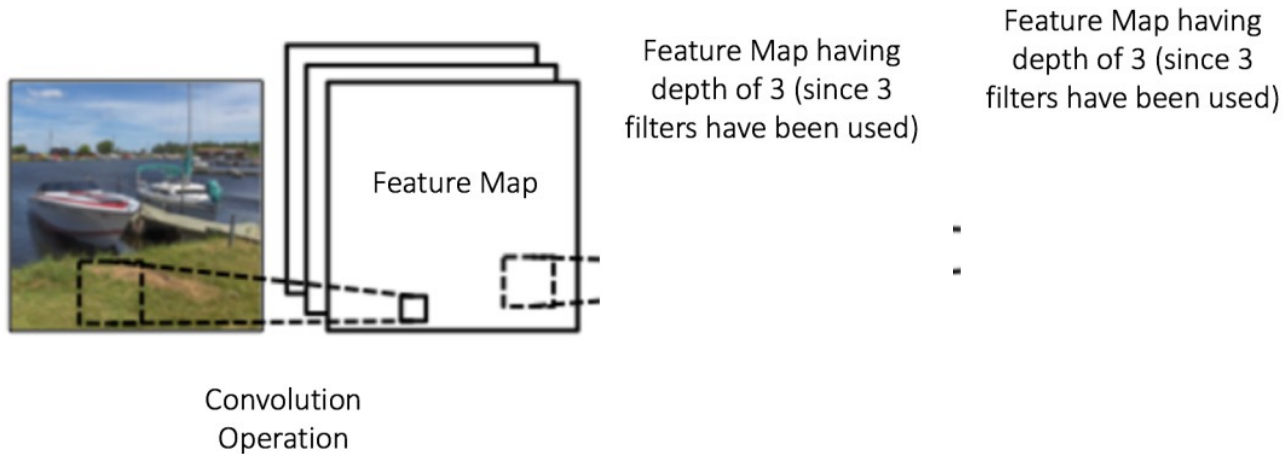
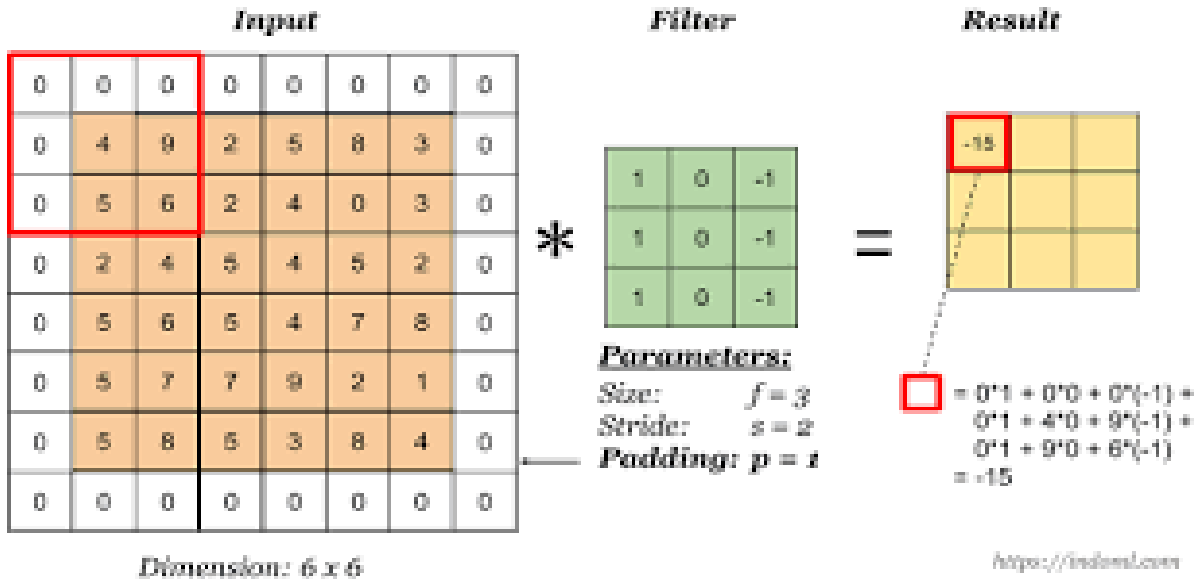
$$\frac{\partial E_{total}}{\partial out_{h1}} = \frac{\partial E_{o1}}{\partial out_{h1}} + \frac{\partial E_{o2}}{\partial out_{h1}}$$



# Convolution neural networks

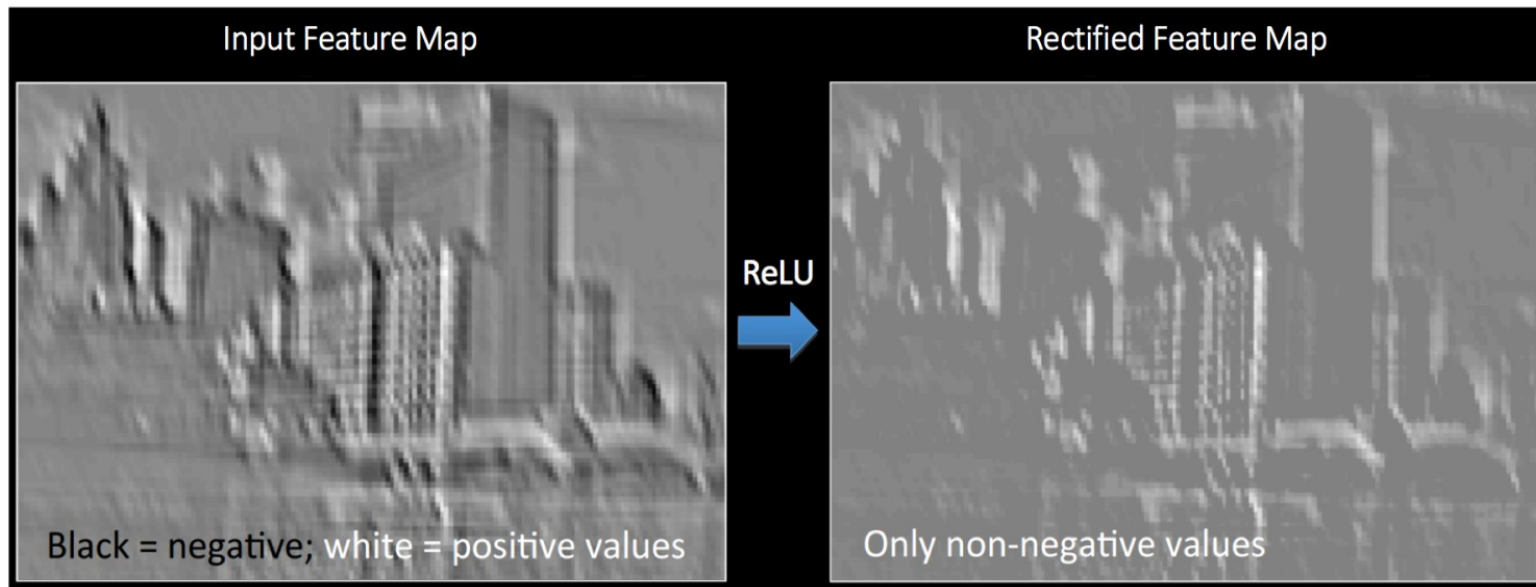
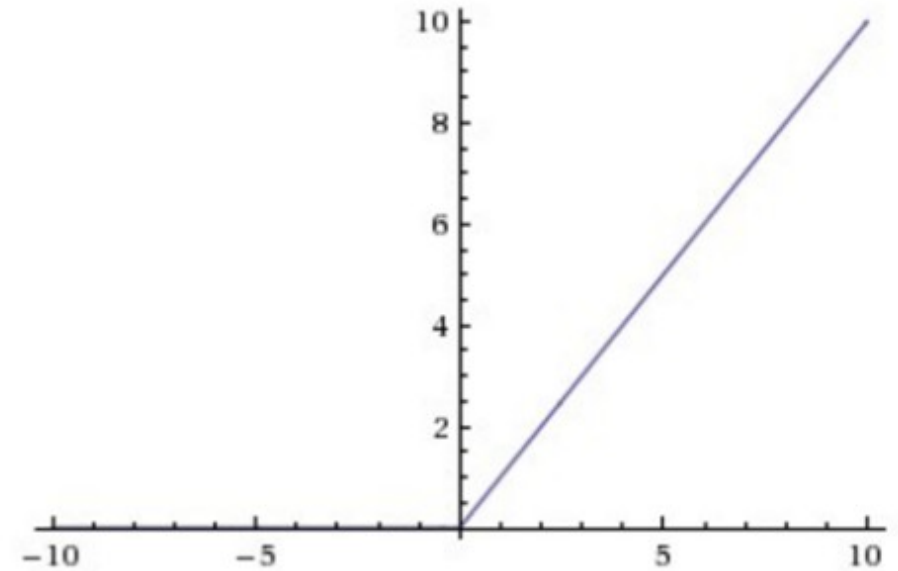


# Stride, padding, depth

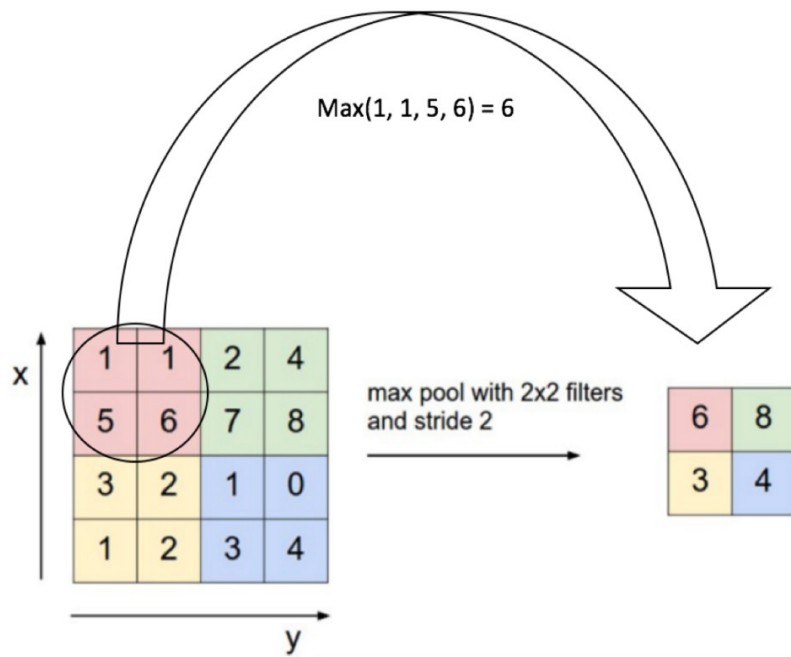


# ReLU

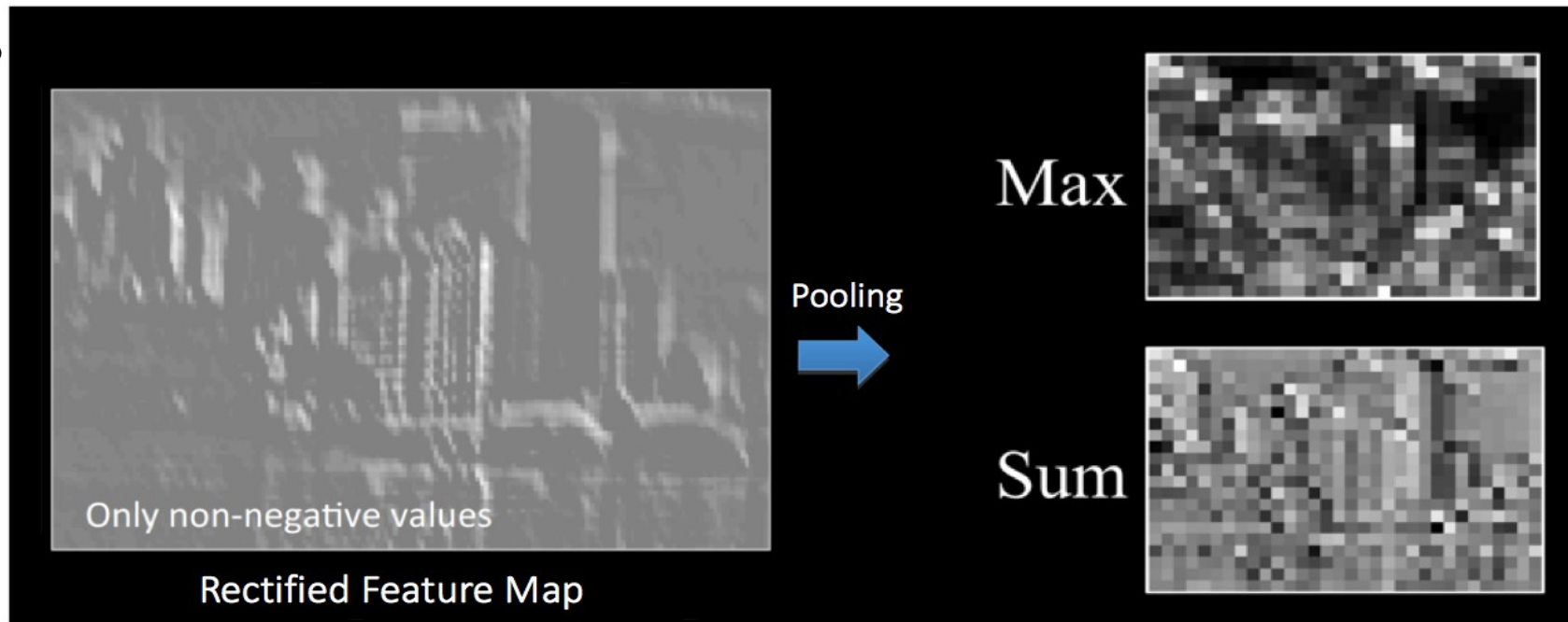
Output =  $\text{Max}(\text{zero}, \text{Input})$



# Pooling

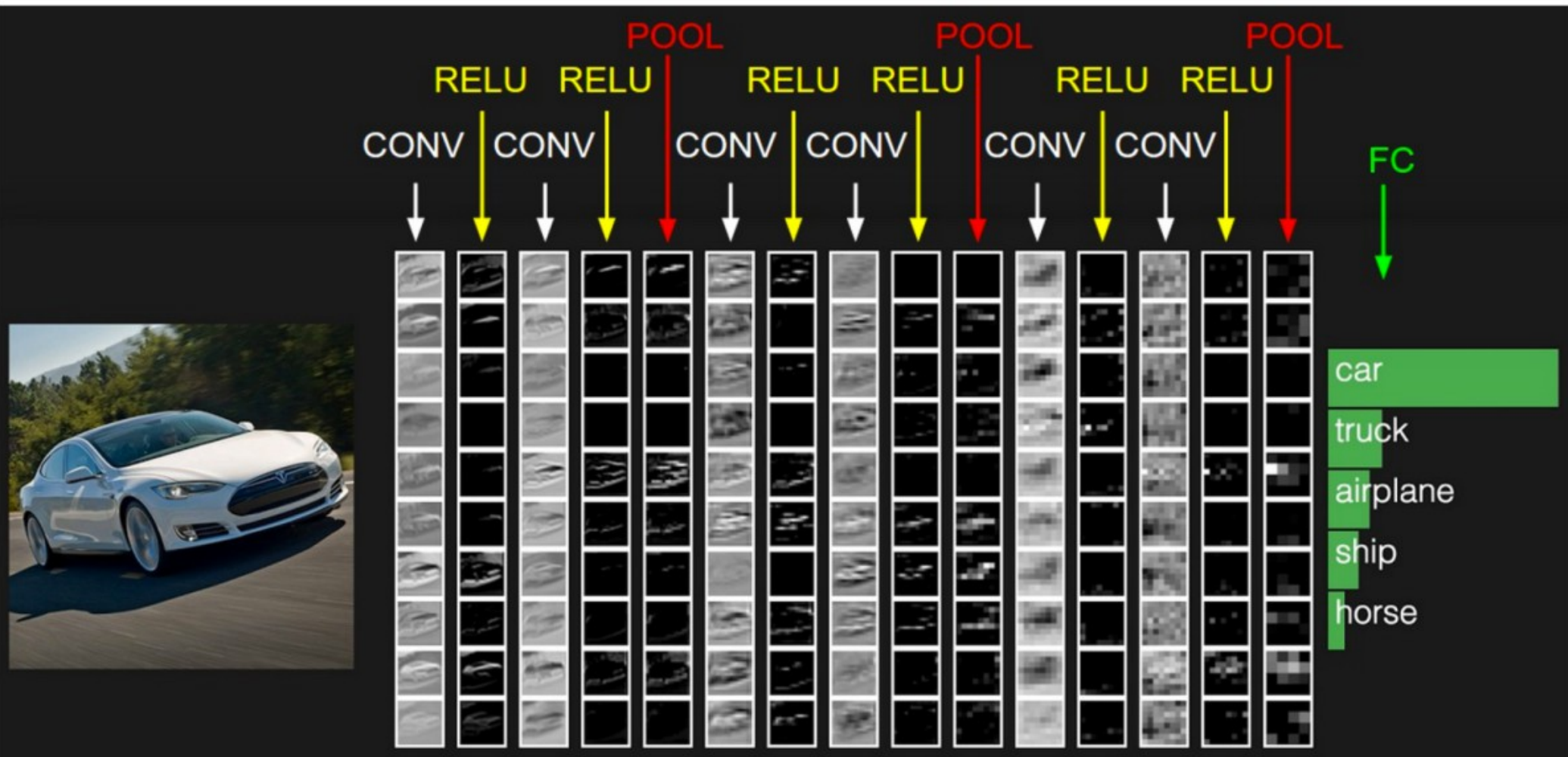


Rectified Feature Map





# Features



# Features

<http://yosinski.com/deepvis#toolbox>