Question 1

A CNN having 6 layers is used for classifying images belonging to 2 classes. The input volume to the network is a colored image having 32 pixels of width and 32 pixels of height. The network first 5 layers are as follows:

- Layer 1: A Convolutional Layer having 5 neurons, each neuron has a receptive field of 3x3 and uses a stride of 1 pixel. The padding is chosen to keep the layer output volume width and height the same as the input image.
- Layer 2: A Convolutional Layer having 10 neurons, each neuron has a receptive field of 3x3, a stride of 1, and a padding of 1 pixel.
- Layer 3: A 4x4 Pooling Layer, stride of 2.
- Layer 4: A Convolutional Layer having 10 neurons, each neuron has a receptive field of 3x3, a stride of 1, and no padding is used.
- Layer 5: Dense Layer having 10 neurons .

Question 1 (cont.)

- Calculate the padding used in the first layer.
- What is the output volume of each layer?
- How many weights are in each layer?
- How many neurons in the output layer?
- What are the activation functions of the output layer neurons?
- If we used a Fully Connected Layer instead of the first Convolutional Layer, how many neurons are needed?

Question 2

Yolo object detector is trained to detect up to 3 overlapped bounding boxes of 10 classes. The input image is divided into 7x7 cells. What is the dimensionality of the output layer tensor?

Question 3

- Given a neural network with 3 input units (A, B, C), two hidden units (D, E), one output unit (F), and a bias unit (ONE) that is associative with each hidden and output unit. The following are the connection weights:
  - **ONE→D:0.5, A→D:-0.5, B→D: 0.0, C→D:1.0**
  - **ONE→E:-0.5, A→E:0.0, B→E:0.0, C→E:0.5**
  - **ONE→F: 0.0, D→F:-0.5, E→F: 0.5**
- The network is trained with an input vector [1*;* 1 ; 0] with a corresponding target t = 1. Assume the hidden and output units use a **Hyperbolic tangent** activation function with a slope, a = 1. And the weights are updated using the backpropagation algorithm. After one iteration what would be the local gradient of nodes F, D, E?

Thanks
for your attention…

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