Homework

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0 Logistics

Dates

Assigned: Mon Sep 17, 2018
Due: Mon Sep 24, 2018

Email me

Subject

CS6301 Homework 3

Body

Attach a file called <abc012345>.txt (where <abc12345> is replaced with your UT Dallas ID) with the answers

1 Assignment

1. Linear algebra. Given: for CNN style 2D convolution with input feature maps of size Ni x Lr x Lc with total top + bottom pad of Fr – 1 and total left + right pad of Fc – 1, filters of size No x Ni x Fr x Fc and output feature maps of size No x Mr x Mc …

What are the dimensions of the corresponding matrix matrix multiplication implementation?

How many MACs are required?

What are the dimensions of the corresponding matrix matrix multiplication implementation if stride by 2 down sampling is used (assume Lr and Lc are divisible by 2)?

2. Calculus. For the 5 layer toy example on slide 45 of the Calculus lecture notes …

What is the full expression for de/d$\mathbf{H}_0$?

By this I mean, start with de/d$\mathbf{H}_0$ = (de/d$\mathbf{x}_1$)(d$\mathbf{x}_1$/d$\mathbf{H}_0$) and repeatedly substitute in for de/d$\mathbf{x}_1$ until you reach de/d$\mathbf{x}_5$. Write out the resulting expression.

3. Probability. For the 5 symbols on slide 68 of the Probability lecture notes …

What is the entropy in bits of the random variable with the given PMF (0.10, 0.15, 0.22, 0.23, 0.30)?

Create 100k symbols based on the distribution and code them using the Huffman code with the specified number of bits.

What is the average number of bits per symbol (total number of bits required to transmit the message / 100k)?

How does the average number of bits compare with the entropy?

4. Algorithms. Create a 5 x 7 feature map initialized with values 0, …, 34 in row major order (1st row is 0, …, 6) …

What is the output of a 3 x 3 / 2 max pooling operation applied to the feature map?

What is the output of a global average pooling operation applied to the feature map?