Homework 05 – Algorithms

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0 Outline

1 Logistics

Assigned: Mon Feb 11, 2019
Due: Mon Feb 18, 2019
Format: PDF uploaded to eLearning

2 Reading

1. Read: Algorithms
https://github.com/arthurredfern/UT-Dallas-CS-6301-CNNs/blob/master/Lectures/xNNs_05_Algorithms.pdf

3 Theory

2. 3x3/2 max pooling applied to an input feature map of size 3 x (2n + 1) generates an output feature map of size 1 x n. What is the minimum number of comparisons required to generate the output feature map? Draw a picture showing your pattern of comparisons (hand drawing is ok).

8 comparisons for the 1st 3x3 tile and 6 comparisons for each subsequent tile for a total of $8 + (n - 1)6 = 6n + 2$ comparisons

As a new tile adds 6 values that need to be compared to at least 1 previous, this appears to be a minimum
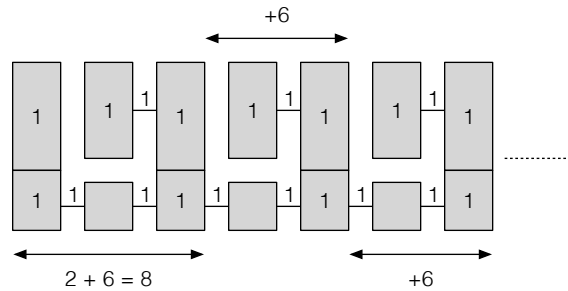
3. 3x3/2 max pooling applied to an input feature map of size $(2m + 1)$ x $(2n + 1)$ generates an output feature map of size m x n. What is the minimum number of comparisons required to generate the output feature map? Draw a picture showing your pattern of comparisons (hand drawing is ok).

Applying the above strategy to each of the block rows of tiles yields $m(6n + 2) = 6mn + 2m$ comparisons

It wasn't immediately obvious that there's a way to reduce this number via sharing computations in both the row and column directions

4 Practice

None