CNN: Find a Line with One Shared Ruler

Name: _____ Date: _____

Instead of inventing new weights for every position, slide the SAME [1,1,1] filter. Multiply corresponding values and add. No padding, stride 1.

One example, already done

Row 01110 has windows 011,111,110. Their scores are 2,3,2. On a 5 by 5 image the feature map is 5 by 3. Global max > 2.5 detects three consecutive black pixels.

Your turn

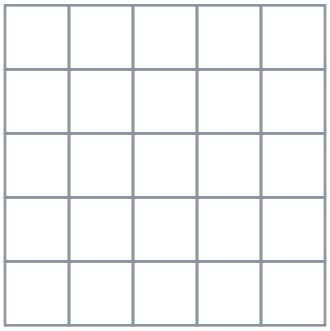
1. Calculate the three window scores for row 00100, then for 01010. Mark which, if any, passes > 2.5.

2. Draw a 5 by 5 image with one 111 run. Fill all 15 feature-map entries. Record the maximum separately from its location.

3. Move the 111 run without clipping it, then move it partly off the image. Compare the feature maps and maxima. Does the filter detect a vertical line?

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Make it visible



Input 5 by 5. Draw the 5 by 3 feature map beside it.

Change one thing

Fill the whole image black. Why does this detector still say YES? Can a maximum alone tell where the line is or whether there was exactly one line?

My puzzle - make it in class

Give a partner a five-pixel row and the shared filter. Keep all three window scores as an answer key. Include one row where the maximum is only 2.

At home (with a parent)

Ask a parent to predict one row’s window scores, then verify with the paper filter.

My parent tried my puzzle: Yes / Not yet Parent initials: _____