



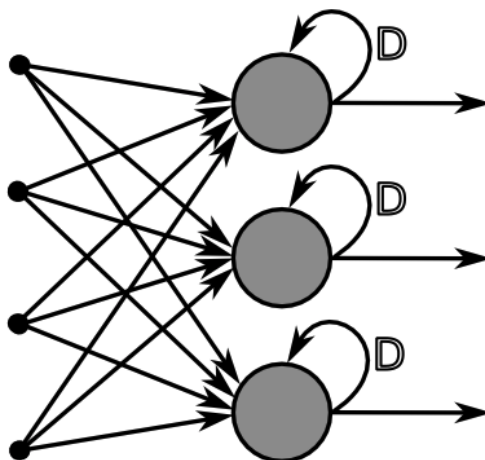
Data Application Lab

Answer for Tuesday Machine Learning Quiz (CNN & RNN)

1. Convolutional Neural Networks can perform various types of transformation (rotations or scaling) in an input". Is the statement correct True or False?

Solution: It is False. Data Preprocessing steps (via rotation, scaling) is necessary before you give the data to neural network because neural network cannot do it itself.

2. You are building a neural network where it gets input from the previous layer as well as from itself.



Which of the following architecture has feedback connections?

- A. Recurrent Neural network
- B. Convolutional Neural Network
- C. Restricted Boltzmann Machine
- D. None of these

3. When pooling layer is added in a convolutional neural network, translation in-variance is preserved. True or False?

Solution: It is True. Translation in-variance is induced when you use pooling.

4. Solution:

1) Since we have P zero paddings, so the input size can be regarded as $(W + 2P) \times (W + 2P) \times 1$.

Then there are $\frac{W+2P-F}{S} + 1$ possible positions for the filter to move horizontally. Hence, adding the fact that there are D filters, the output volume is of size $(\frac{W+2P-F}{S} + 1) \times (\frac{W+2P-F}{S} + 1) \times D$.

2) If the sizes for two layers are the same, and $F = f$, then

$$W = \frac{W - f + 2P}{S} + 1.$$

The most natural way to set up S and P is letting $S = 1, P = \frac{f-1}{2}$.

5. Solution:

filter 1: after inner product calculations with filter 1, the resulting layer is of size 3×3 .

The 9 numbers are: -1, 0, -1; -2, 0, -1; -3, 1 -1. Namely the output is the following:

-1	0	-1
-2	0	-1
-3	1	-1

filter 2: Similarly we obtain another 3×3 output with the numbers: -1, 2, 1; -4, -2, -1; -3, -1, 1 respectively.

-1	2	1
-4	-2	-1
-3	-1	1

The function of the first filter is to detect the feature of black vertical lines; while the function of the second filter is to detect the feature of black corners (the 1's in the filters).