Deep Learning - Homework 2 - Group 52

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Question 1.1

Layer	**Shape**	**Size**	**Parameters**
Input	(28, 28, 3)	2352	0
Conv Layer	(24, 24, 8)	4608	608
Max Pooling	(11, 11, 8)	968	0
Linear	(10, 1)	10	9690
Softmax	(1, 1)	1	0
Total	-	-	**10298**

Question 1.2

Layer	Shape	Size	Parameters
Input	(28, 28, 3)	2352	0
Fully Connected	(100, 10)	100	235300
Linear	(10, 1)	10	1010
Softmax	(1, 1)	1	0
Total	-	-	**236310**

The convolutional neural network has a lot less parameters than the fully connected option, 10 298 compared to 236 610, respectively. This way, it should be faster to obtain accurate results.

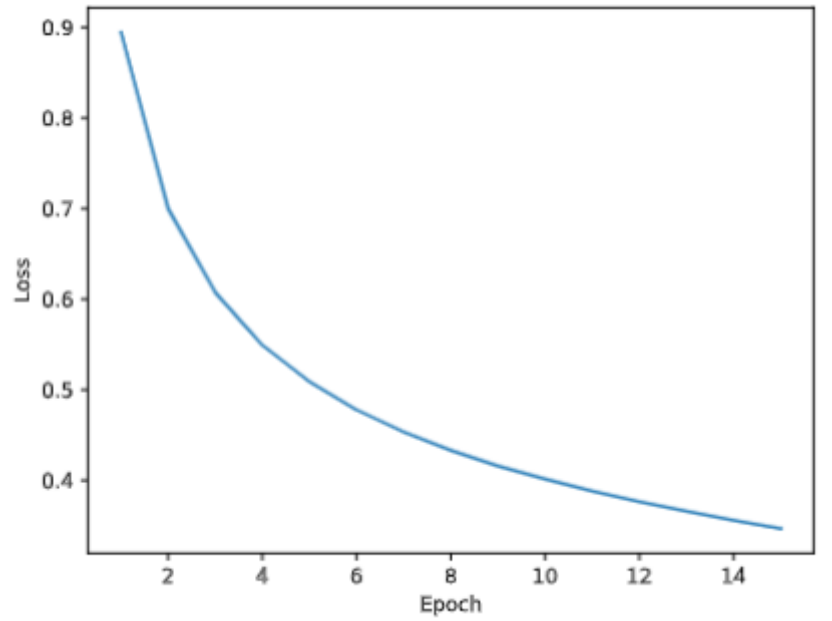
Question 2.1

With convolutional layers, we can capture translational equivariances in images. This is useful because the object in the image does not need to be fixed in order to be detected by the CNN.

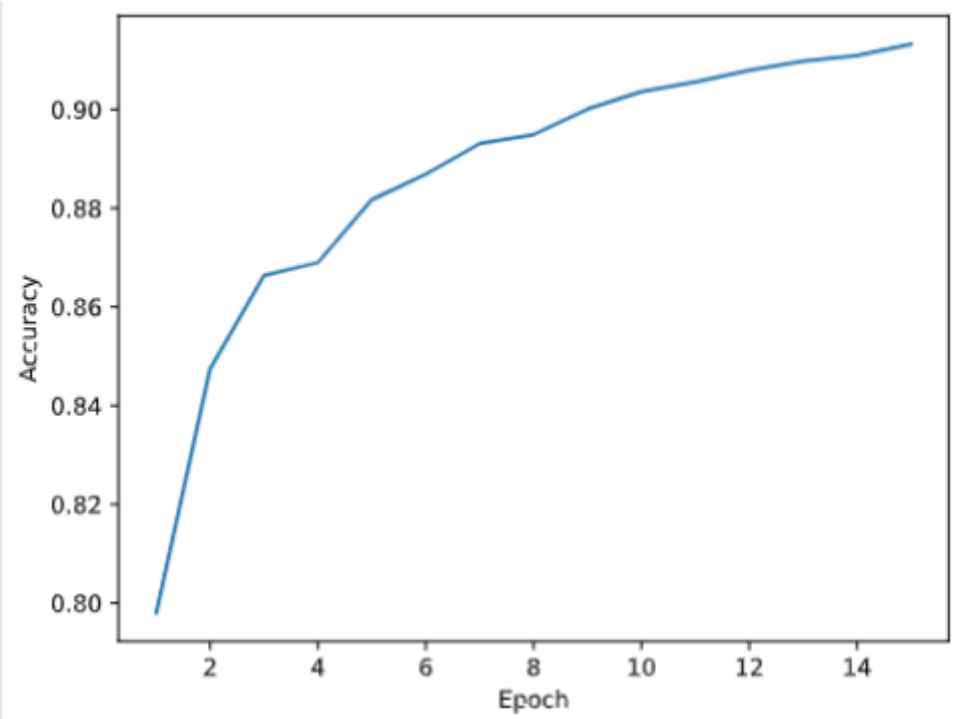
Question 2.2

Learning Rate	Training Loss	Validation Accuracy	Test Accuracy
0.001	0.6773	0.8526	0.8475
0.01	0.3469	0.9132	**0.9073**
0.1	0.3002	0.8906	0.8876

Training Loss

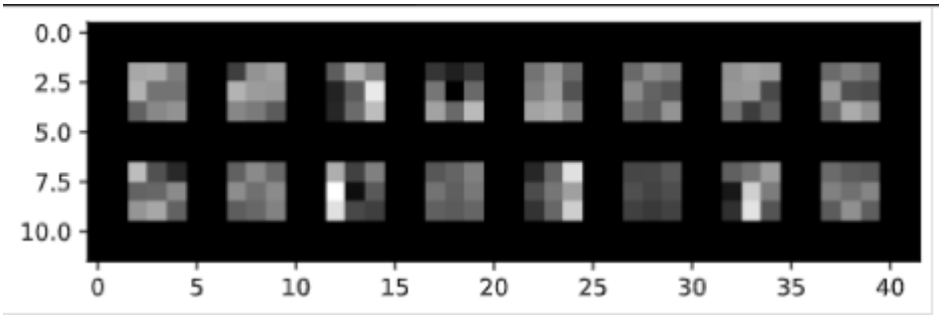


Validation Accuracy

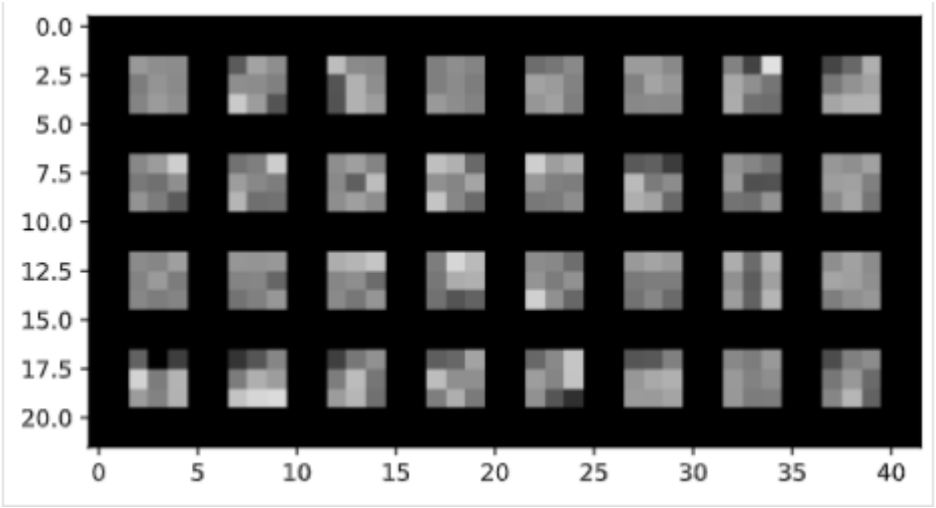


Question 2.3

Layer 1



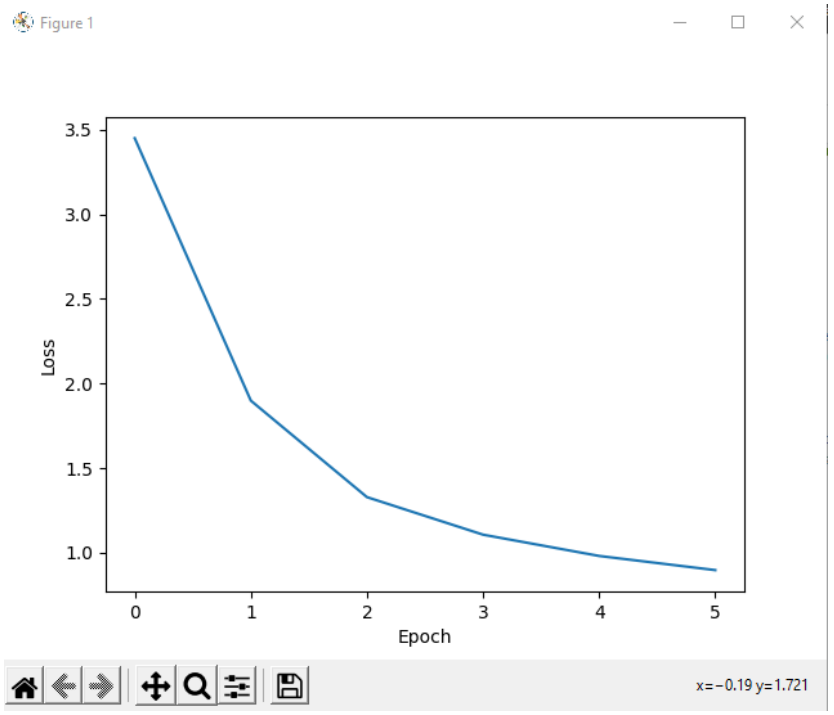
Layer 2

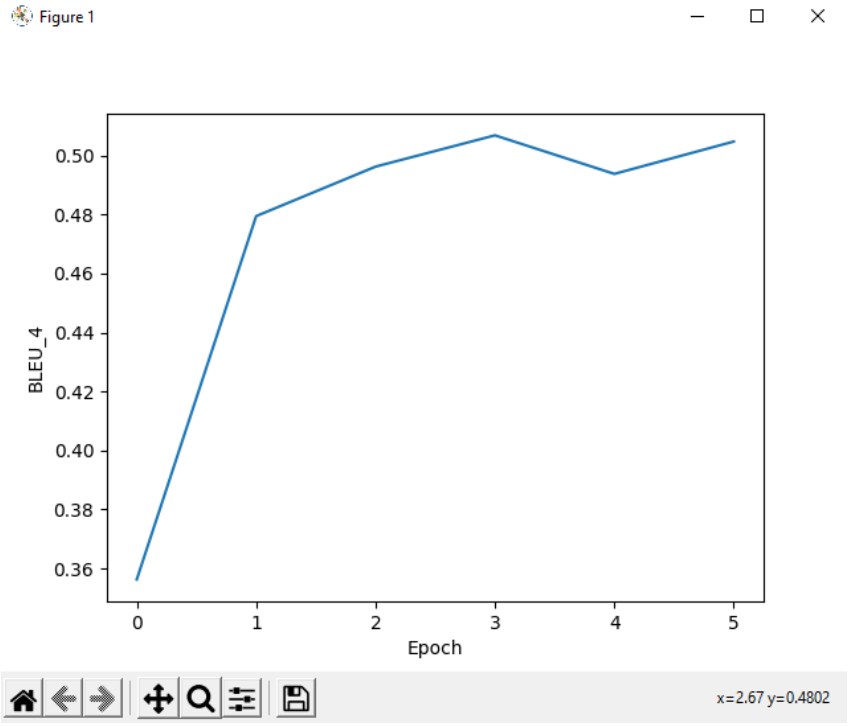


The top layer is expected to capture a “semantic” representation, like an object. The bottom layer is expected to capture more low-level representations, like corners and edges.

Question 3.1 a)

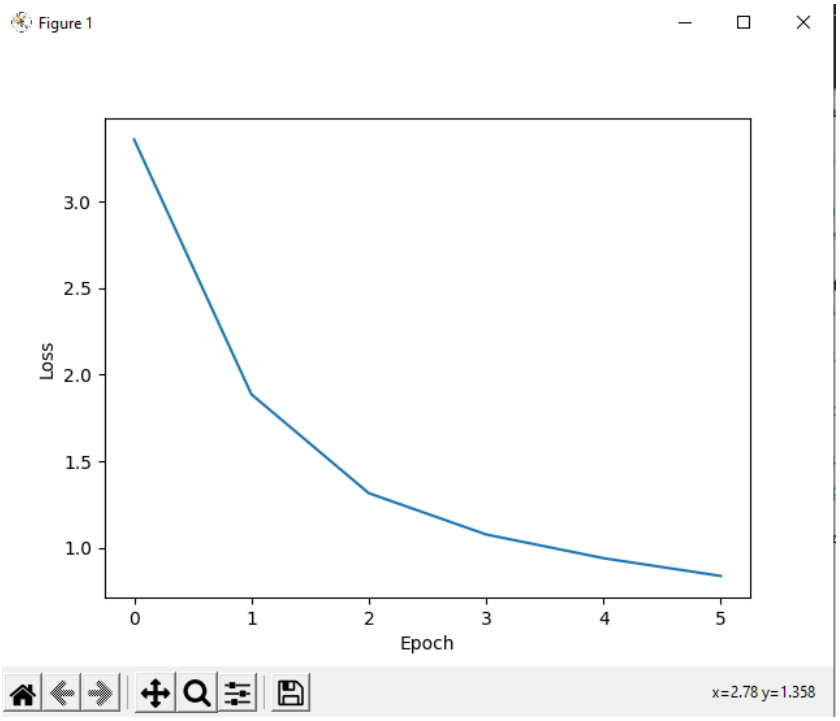
Final Test Bleu-4: **0.5371**

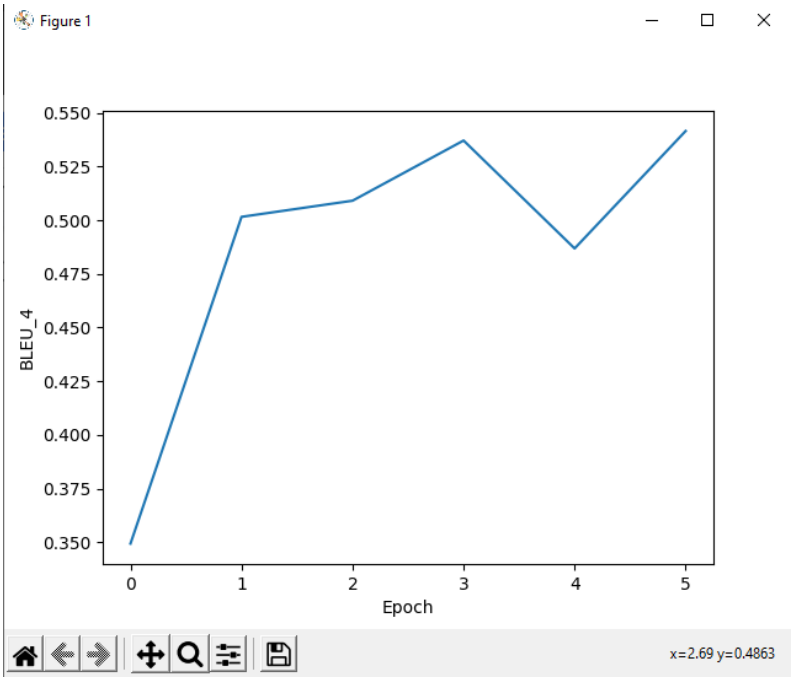




Question 3.1 b)

Final Test Bleu-4: **0.5486**





Question 3.1 c)

	**Image: 219.tif** **Caption:** A residential area with houses arranged neatly and some roads go through this area
	**Image: 540.tif** **Caption:** An industrial area with many white buildings and some roads go through
	**Image: 357.tif** **Caption:** A curved river with some green waters and a highway passed by