

Assignment 5

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1.3

1 XOR dataset

Topology includes a hidden layer

of 4 neurons with relu activation

seeds = 6, 7, 8, 9, 10

These continuous seeds give an average
accuracy of 91.648 $\left[\frac{97 + 98.8 + 83.1 + 83.0 + 96.34}{5} \right]$

2 Circle dataset

Topology includes a hidden layer of 2 neurons
of relu activation

seeds = 2, 3, 4, 5, 6

These continuous seeds give an average
accuracy of 93.2 $\left[\frac{96.7 + 96.8 + 77.4 + 97.8 + 97.3}{5} \right]$

3 MNIST dataset

No hidden layer for this network
just an output softmax layer

seeds = 0, 1, 2, 3, 4

These seeds give an accuracy of 91.94

$$91.94 = \left[\frac{91.95 + 91.97 + 91.96 + 91.94 + 91.9}{5} \right]$$

Y CIFAR10 dataset

layer 1 → convolution layer with relu

$$\text{Filter} = 3 \times 3$$

$$\text{Depth} = 32$$

$$\text{stride} = 1$$

layer 2 → Avg Pooling layer

$$\text{Filter} = 2 \times 2$$

$$\text{stride} = 2$$

layer 3 → convolution layer with relu

$$\text{Filter} = 4 \times 4$$

$$\text{Depth} = 64$$

$$\text{stride} = 1$$

layer 4 → Max pooling layer

$$\text{Filter} = 2 \times 2$$

$$\text{stride} = 2$$

layer 5 → Flatten layer

layer 6 → Fully connected layer with 128 neurons and relu

layer 7 → softmax output

achieved 42% accuracy

0.2

Task 1

features like difference in size, body type (thin, thick), presence of handle, presence of steering wheel, number of wheels. We can add convolution filters to recognize such features. Also the size difference in the spatial domain gets reduced drastically as we go forward in the network. This is because of Max/Avg Pooling layers. This is the way CNN addresses the difference in location of objects.

Task 2 To detect multiple objects we can maintain separate feature maps for each of N objects. Each output node will be connected to only those maps which belong to the object represented by that neuron. Activation will represent the probability that whether corresponding object is in image.

Task 3

To detect overlapping objects in the same image we can ~~not~~ use smaller sized filters as to have more filters lying on the object. This increases the probability of object being recognised.