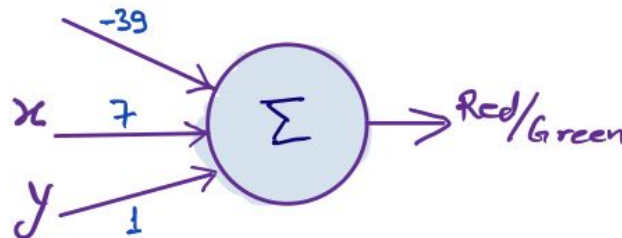


AIML- Cohort 1 -- C6
Compri Regular Exam
Max Marks : 30

Q1. Consider a database with each data point having two features x and y . A data point could be in one of the two classes, red or green. Let the data points in red and green class be as shown below.

Red points	(11,7), (11,10), (10,5), (10,8), (10,13), (8,7), (8,10), (7,9), (7,2), (5,7), (5,11), (3,11)
Green points	(1,2), (1,5), (1,8), (2,4), (2,7), (3,1), (3,3), (4,4), (5,1), (5,3), (6,3), (8,1)

A perceptron is being trained to predict the color of the data points. While training, let weights of the perceptron are as below



Determine accuracy (in %) of the current model. Is it possible to train this perceptron to get 100% accuracy? Justify your answer. [Marks 5+1]

Answer-01:

Apply $7x+y-39$ to get classification.

Three points would be misclassified (3,11) (6,3) (8,1) so accuracy is $(24-3)/24=87.5\%$

Yes it is possible to get 100% accuracy as the data is linearly separable.

Q2. Consider three activation functions sigmoid(x), tanh(x) and softplus(x). Arrange them based on their gradient amplitude, which corresponds to the steepness of their learning rate at the following two points.

i) $x=0$

ii) $x=0.25$

[Marks 3+3]

Answer-02: Find derivative of

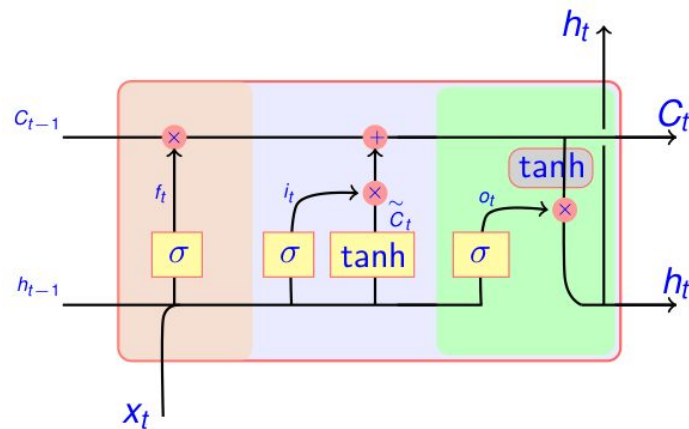
	0	0.25
derivative of sigmoid	0.25	0.246
derivative of tanh	1	0.94
derivative of softplus	0.5	0.56

So the order is

i) derivative of sigmoid < derivative of softplus < derivative of tanh

ii) derivative of sigmoid < derivative of softplus < derivative of tanh

Q3. Consider a long short term memory (LSTM) architecture as shown below. What is the purpose of two tanh in the same.



[Marks 2+2]

Answer-03:

First tanh: How much we want to update each state value and in what way (positive or negative)

Second tanh: To decide how much cell state is going to contribute in output.

Q4: How faster-RCNN have improves the fast-RCNN. Explain the technical changes and their effect on the overall results obtained. [Marks 2+2]

Answer-04:

Faster RCNN is the modified version of Fast RCNN. The major difference between them is that Fast RCNN uses selective search for generating Regions of Interest, while Faster RCNN uses "Region Proposal Network". Faster RCNN follow following approach:

1. We take an image as input and pass it to the ConvNet which returns the feature map for that image.
2. Region proposal network is applied on these feature maps. This returns the object proposals along with their objectness score.
3. A RoI pooling layer is applied on these proposals to bring down all the proposals to the same size.
4. Finally, the proposals are passed to a fully connected layer which has a softmax layer and a linear regression layer at its top, to classify and output the bounding boxes for objects.

Q5. Provide an example of a problem where it is advisable to systematically decrease the number of neurons in the hidden layer and then to increase the same after some layers. Justify your answer in terms of why it was advised and how it worked. [Marks 1+3]

Answer-05:

Any example application of autoencoder-works

Q6. Explain the following concepts in machine learning
2+2+2]

[Marks

- i) Two examples of application of one-to-many RNN architecture
- ii) Cycle GAN
- iii) Provide a counter-example to support that a histogram cannot be taken as an image feature.

Answer-06:

- i) Image to its description
- ii) Used for style transfer. Explain adversarial architecture.
- lii) Randomly exchange all the pixels of the image. It would have the same histogram but not an images.