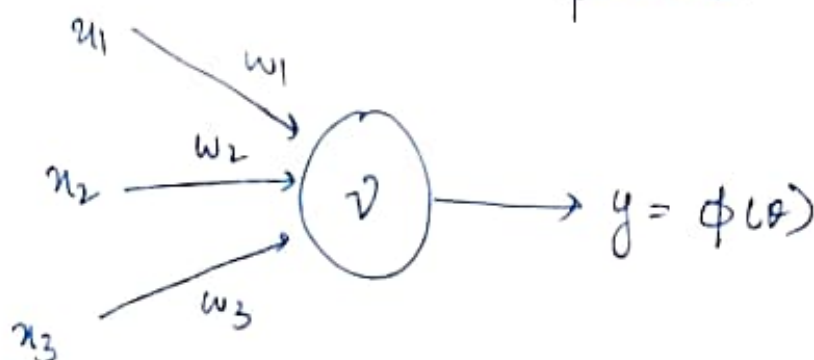


Deep learning of Artificial Intelligence

Assignment-4.1

Q1) Consider patterns:



$$\begin{aligned} w_1 &= 2 \\ w_2 &= -4 \\ w_3 &= 1 \end{aligned}$$

$$\psi(v) = \begin{cases} 1 & \text{if } v \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Pattern	p_1	p_2	p_3	p_4
x_1	1	0	1	1
x_2	0	1	0	1
x_3	0	1	1	1

For pattern p_1 ,

$$\begin{aligned} v &= x_1 w_1 + x_2 w_2 + x_3 w_3 \\ &= 2 \end{aligned}$$

$$\boxed{y = \psi(v) = 1} \quad (\because 2 \geq 0)$$

For pattern p_2 ,

$$\begin{aligned} v &= x_1 w_1 + x_2 w_2 + x_3 w_3 \\ &= 0 + (-4) + 1 \\ &= -3 \end{aligned}$$

$$\begin{aligned} y &= \psi(v) = 0 \\ &(\because -3 < 0) \end{aligned}$$

For pattern P_3 ,

$$V = x_1 w_1 + x_2 w_2 + x_3 w_3$$

$$V = 2 + 0 + 1 = 3$$

$$y = \psi(V) = 1 \quad (\because 3 > 0)$$

For pattern P_4 ,

$$V = x_1 w_1 + x_2 w_2 + x_3 w_3$$

$$V = 2 - 4 + 1 = -1$$

$$y = \psi(V) = 0 \quad (\because -1 < 0)$$

Pattern	P_1	P_2	P_3	P_4
x_1	1	0	1	1
x_2	0	1	0	1
x_3	0	1	1	1
Output	1	0	1	0

Ans

Q2) What is an Epoch?

Ans) A epoch in machine learning means a complete pass of the training dataset through the algorithm. The number of epochs is an important hyper-parameter for the algorithm. It specifies the number of epochs or complete passes of entire training dataset that the algorithm undergoes in the training or learning process.

With each epoch, the dataset's internal model parameters are updated.

Therefore, the epoch of 1 batch is called

the batch gradient descent learning algorithm. Usually, the batch size of an epoch is 1 or more and is always an integer value in the epoch number.

It can also ~~also~~ be seen as a for loop with specified number of epochs in which each loop path traverses the entire dataset. A for-loop is a nested for-loop that allows the loop to iterate over a specified sample number in a batch when the "batch size" is specified as one.

Typical values of the number of epochs when the training algorithm can run in 1000's of epochs and the process is set ~~to continue~~ to continue until the model error is sufficiently low.

Usually, ~~into~~ tutorials and examples use numbers like 10, 50, 100, 1000, or even bigger.

line plots can be created for the training process, in which the x-axis is the epoch in machine learning and the y-axis is the skill or model error. This type of line plot

is called the learning curve of an algorithm and helps diagnose problems such as learning the training to set down, up, or down as appropriate.

Difference between Epoch and Batch:

The model updates when a specific number of samples are processed, known as the batch size of the sample. The no of complete passes of the training dataset is also an important and is called the epoch in the ~~the~~ machine learning number in the training dataset. The batch size is typically equal to 1 and can be equal to or less than the sample count of the training dataset.

The epoch in a neural network or epoch number is usually an integer value b/w 1 and infinity. Thus one can run the algorithm for any period. To prevent the algorithm from running, one can use a fixed epoch number and factor in the

model error rate of change over time.

In machine learning algorithms, both batch size and epoch and hyper-parameters containing ~~integers~~ integers are as values to be used by the training model. A learning process does not find these values because they are not intrinsic parameters of the model and must be specified for the process when training the algorithm on the training dataset. The numbers are also not fixed values and, depending on the algorithm, it may be necessary to try different integer values before finding the most appropriate values for the procedure.

Example -

Consider this ~~explan~~ example from an era in machine learning. Suppose one uses a dataset with 100 samples (where samples means data rows) with 1000 ~~examples~~

epochs and 5 ~~batch~~ batch sizes to define epoch making. The dataset then contains 5 samples in each of the 40 batches, with the model weights being updated at every batch of 5 samples has passed. Now, in this case, machine learning consists of 40 batches in one epoch, which means the model will ~~updated~~ be updated 40 times.

Furthermore, since the epoch count is 1,000, the entire dataset passes by model, and the model itself passes through 1,000 times. When the model has 40 batches or updates, it means that there are 40,000 batches in the training dataset and in the process of training the algorithm on this dataset.

Note :- Be aware that there is no guarantee a network will converge or "get better" by letting it learn the data ~~from~~ for multiple epochs. It is an art in machine learning to decide the ~~no~~ number of epochs sufficient for a network.

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