

1. (1) Most machine learning methods work well because of human-designed representations and input features. ML become just optimizing weights to best make a final prediction.

Deep learning is a machine learning subfield of learning representations of data. It is exceptional effective at learning patterns. DL algorithms attempt to learn representation by using a hierarchy of multiple layers.

ML separates feature extraction and classification, while DL connects them.

(2)

1) Manually designed features are often over-specified, incomplete and take a long time to design and validate.

2) Learning Features are easy to adapt, fast to learn.

3) Deep learning provides a very flexible, (almost) universal, learnable framework for representing world, visual and linguistic information.

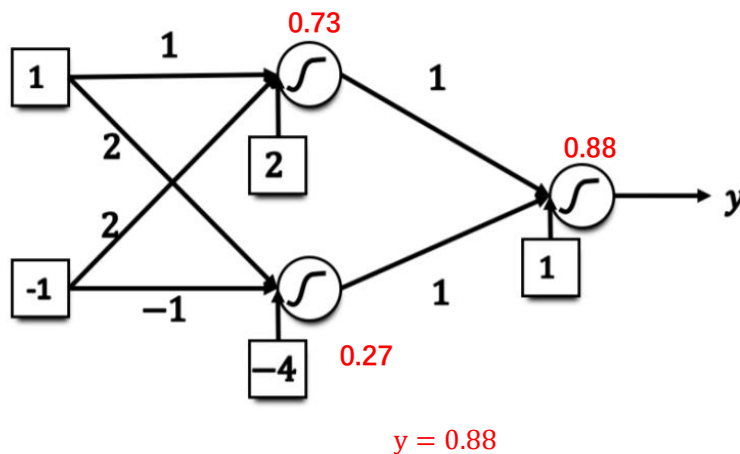
4) Can learn both unsupervised and supervised.

5) Effective end-to-end joint system learning.

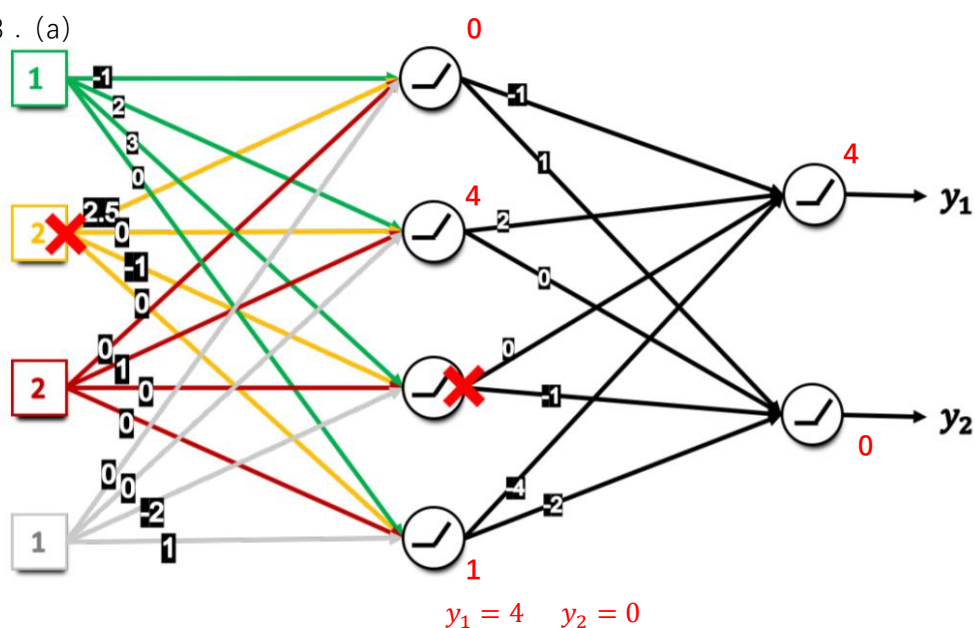
6) Utilize large amounts of training data.

2. (a)  $output = \sigma(x_1 * w_1 + x_2 * w_2 + x_3 * w_3 + b)$

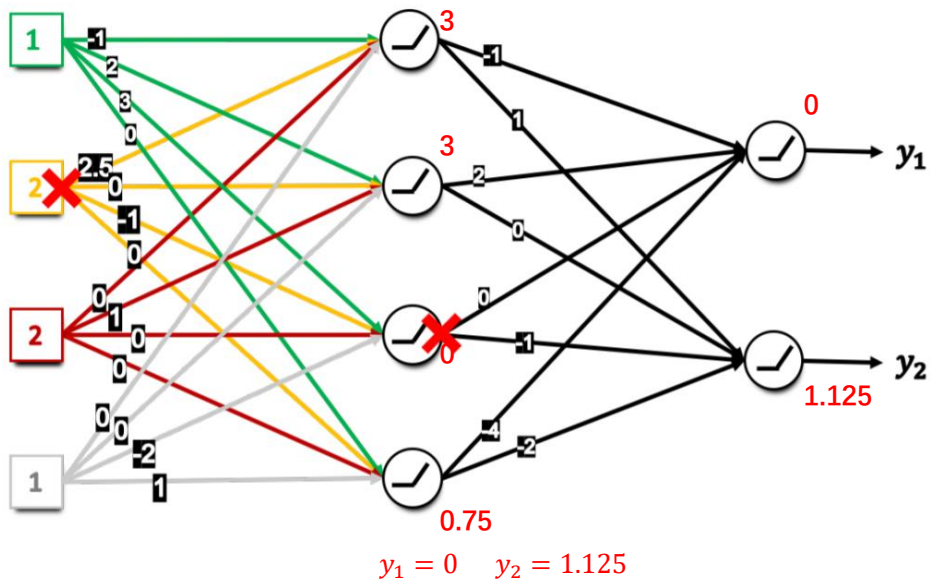
(b)



3. (a)



(b)



4 . (a)

$$y_A = 1 \quad y_B = 0 \quad y_C = 0$$

(b) the decision boundary is :

$$\begin{cases} x_1 \geq 1 \\ x_2 \geq 1 \\ x_1 + x_2 \leq 29 \end{cases}$$