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.

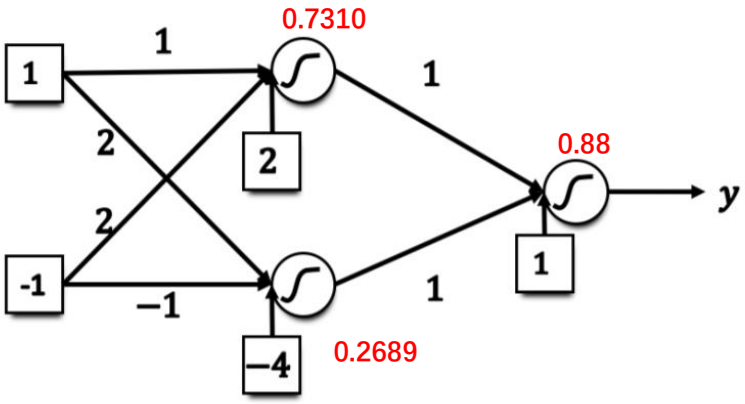
4)Can learn both unsupervised and supervised.

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

6)Utilize large amounts of training data.

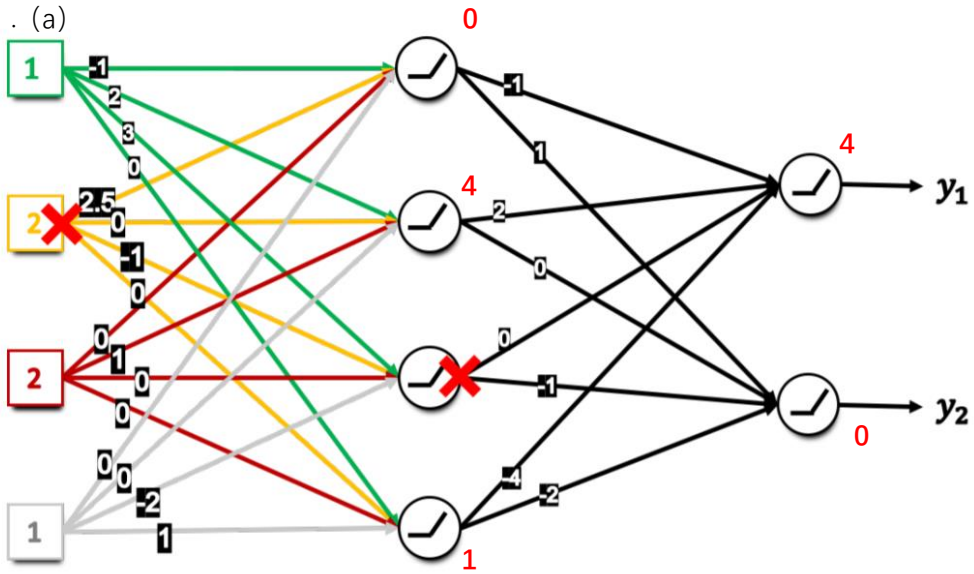
2．(a)$output = \sigma(x1 * w1 + x2 * w2 + x3 * w3 + b)$

(b)



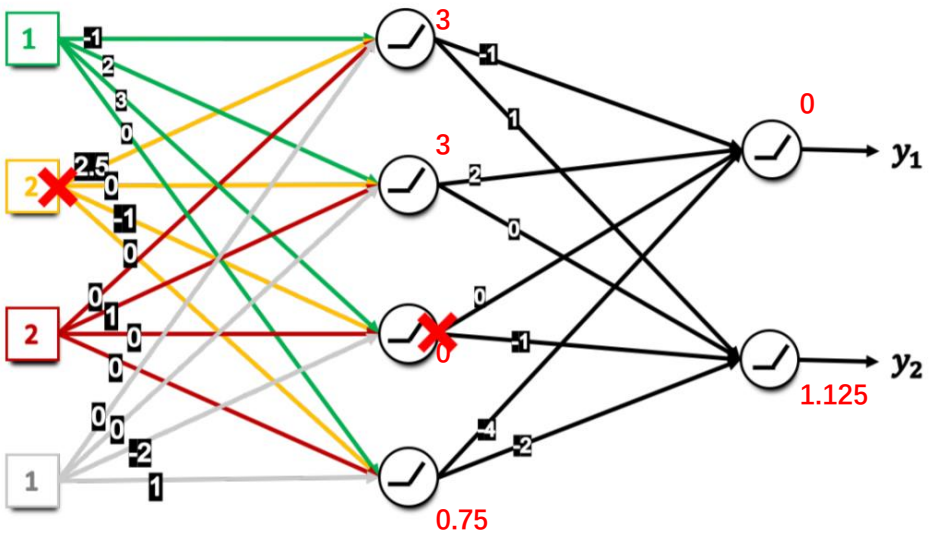
$y = 0.88$

3．(a)



$y_1 = 4 \quad y_2 = 0$

(b)



$y_1 = 0 \quad y_2 = 1.125$

4．(a)

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

(b) the decision boundary is :

$$\begin{cases} x_1 = 0 \\ x_2 > 0 \end{cases} \text{或} \begin{cases} x_1 > 0 \\ x_2 = 0 \end{cases}$$