$$NLL\left(D, \mathbf{w}\right) = -\sum_{i=1}^{N}\left[(1-y_i)\log(1-\sigma(\mathbf{w}^T\mathbf{x}_i)) + y_i \log\sigma(\mathbf{w}^T\mathbf{x}_i)\right]$$

$$\frac{\partial y_i \log\sigma(\mathbf{w}^T\mathbf{x}_i)}{\partial w} = x\sigma(1-\sigma(\mathbf{w}^T\mathbf{x}_i)(\sigma(\mathbf{w}^T\mathbf{x}_i)) \tag{1}$$

It's analogous for the other part of the equation. When we combine them together :

$$= (y_i(1-\sigma(\mathbf{w}^T\mathbf{x}_i)) - (1-y)(\sigma(\mathbf{w}^T\mathbf{x}_i)))x_i \tag{2}$$

We define :

$$h_\sigma = \frac{1}{1+e^(-w^Tx)} \tag{3}$$

Then:

$$\frac{\partial NLL}{\partial w} = (y_i - h_\sigma)x_i \tag{4}$$

1.2.a

$$NLL\left(D, \mathbf{w}\right) = -\left[(1-y_t)\log(1-\sigma(\mathbf{w}^T\mathbf{x}_t)) + y_t \log\sigma(\mathbf{w}^T\mathbf{x}_t)\right]$$

1.2.b

1.2.c

1.2.e

$$w_t = w_t - \eta((y_t - \sigma(\mathbf{w}^T\mathbf{x_t}))x_t - \mu\|\mathbf{w}\|^2)$$

Metric	Deceased patients	Alive patients
Event Count		
1. Average Event Count	683.15	769.54
2. Max Event Count	12627	16829
3. Min Event Count	1	1
Encounter Count		
1. Average Encounter Count		
2. Max Encounter Count		
3. Min Encounter Count		
Record Length		
1. Average Record Length		
2. Median Record Length		
3. Max Record Length		
4. Min Record Length		
Common Diagnosis		
Common Laboratory Test		
Common Medication		

Table 1: Descriptive statistics for alive and dead patients