Logistic regression algorithm

1. Initialize the weights at $t = 0$ to $\mathbf{w}(0)$
2. for $t = 0, 1, 2, \ldots$ do
   3. Compute the gradient

   $$\nabla E_{\text{in}} = - \frac{1}{N} \sum_{n=1}^{N} \frac{y_n x_n}{1 + e^{y_n \mathbf{w}^T(t) \mathbf{x}_n}}$$

4. Update the weights: $\mathbf{w}(t + 1) = \mathbf{w}(t) - \eta \nabla E_{\text{in}}$
5. Iterate to the next step until it is time to stop
6. Return the final weights $\mathbf{w}$