Algorithm 1 Logistic Regression Analysis

Require: Training dataset $\{(x_1, y_1), (x_2, y_2), \ldots, (x_N, y_N)\}$, learning rate η, number of iterations $MaxIter$

Ensure: Logistic regression model parameters θ

Initialize parameters θ to small random values
for $iter = 1$ **to** $MaxIter$ **do**
    for each sample $i = 1$ **to** N **do**
        Compute predicted value: $\hat{y}_i = \sigma(\theta^T x_i)$
        Compute gradient: $\nabla_\theta = \frac{1}{N}(y_i - \hat{y}_i)x_i$
        Update parameters: $\theta \leftarrow \theta + \eta \nabla_\theta$
    end for
    if convergence or maximum number of iterations reached **then**
        break
    end if
end for
return θ