Logistic Regression on m examples

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$$J(w,b) = \frac{1}{m}\sum_{i=1}^{m}\mathcal{L}(a^{(i)}, y^{(i)})$$

$$\therefore a^{(i)} = \hat{y}^{(i)} = \sigma(z^{(i)}) = \sigma(w^T x^{(i)} + b)$$

→ we know how to compute → $dw_1^{(i)}, dw_2^{(i)}, db^{(i)}$

∴ Given $x^{(i)}, y^{(i)}$

$$\frac{\partial}{\partial w_i} J(w,b) = \frac{1}{m}\sum_{i=1}^{m}\frac{\partial}{\partial w_i}\mathcal{L}(a^{(i)}, y^{(i)})$$

$dw_1^{(i)} \Rightarrow (x^{(i)}, y^{(i)})$

$$\frac{\partial}{\partial w_i} J(w,b) = \frac{1}{m}\sum_{i=1}^{m}\varphi(a^{(i)}, y^{(i)})$$