Lecture Note 7

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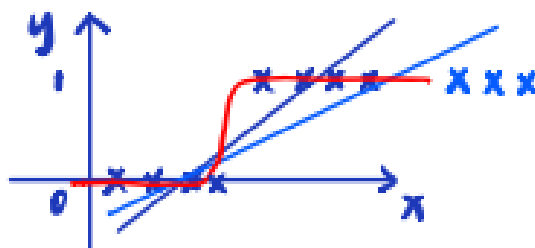
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1   Softmax Regression Algorithm

Softmax is an extension of Logistic Regression (LR).
LR setup : $y \in \{0, 1\} \leftarrow discrete$
want: $h_\theta \in [0, 1]$

Linear reg: $[\ \text{-}\infty, \infty\ ]$
Choose: $h_\theta(x) = g(\theta^T x) = \frac{1}{1+e^{-\theta^T x}}$,
where $g(z) = \frac{1}{1+e^{-z}}$
(note: $z \to -\infty\ g(z), \to 0$,
$z \to \infty\ g(z), \to 1$)
g is called sigmoid/Logistic function
Here: g:$(-\infty, \infty) \to (0, 1)$
p(y=1| $x; \theta) = h_\theta(x) = \frac{1}{1+e^{-\theta^T x}}$
p(y=0| $y; \theta) = 1 - h_\theta(x) \geq 0\ (0 \leq h_\theta(x) \leq 1)$
Next, we are going to write the prob. fcn into one equation.