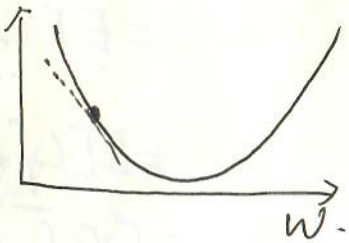
梯度下降：

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

find w and b to minimize $J(w,b)$

$$w := w - \alpha\frac{dJ(w,b)}{dw}$$

$$b := b - \alpha\frac{dJ(w,b)}{db}$$

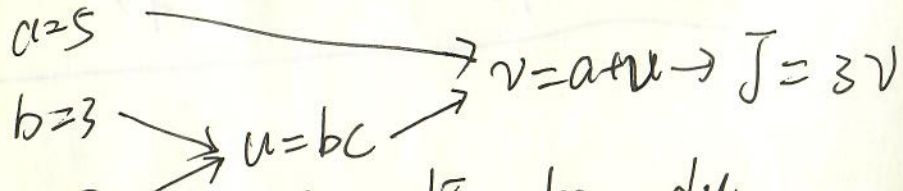


2.5 导数

$$e^x dx = e^x$$

2.6 计算图

$\frac{d\,\text{Final Output}}{d\,\text{Var}}$



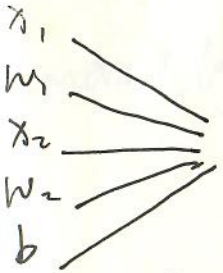
$y=x^{-1}$

$=-1\cdot x^{-2}$

2.9 logistic 回归中的梯度下降

从最后对前一项依次求导，得到结果对输入的导数。

$\frac{ze^{-z}}{(1+e^{-z})^2}$ $\quad \frac{(1+e^{-z})^{-2}\cdot ze^{-z}}{\text{上}\cdot(1+e^{-z})^{-2}\cdot\text{上}\cdot e^{-z}}$ $\quad \frac{1}{1+e^{-z}}$



$z=w_1x_1+w_2x_2+b \rightarrow a=\sigma(z) \rightarrow L(a,y)$

$$da=\frac{dL(a,y)}{da}=\frac{d\left(-[y\log a+(1-y)\log(1-a)]\right)}{da}$$

反函数的导数等于直接函数导数的倒数。

$$=-\left(\frac{y}{a\ln e}+1\cdot\frac{1-y}{(1-a)\ln e}\right)$$

$$=-\frac{y}{a}+\frac{1-y}{1-a}$$

$(a=\hat{y})$

$$dw_1=\frac{dL(a,y)}{dw_1}=\frac{dL(a,y)}{da}\cdot\frac{da}{dz}\cdot\frac{dz}{dw_1}$$

$$=\left(-\frac{y}{a}+\frac{1-y}{1-a}\right)\cdot a(1-a)\cdot x_1$$