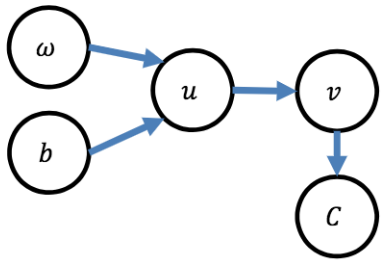
Shashank Shekhar **ECE542_Lobaton**

Assignment Homework4 due 02/04/2019 at 08:00pm EST

1. (10 points)

Let $x \in \mathbb{R}^{n_I}$ and $y \in \{0,1\}$. Consider the logistic regression model $v = \sigma(\omega^T x + b)$ trained using an entropy loss function $L(y,v) = yln(v) + (1-y)ln(1-v)$.

The computational graph for the training procedure is given below, where $u(\omega,b) := x^T\omega + b$, $v(u) := \sigma(u)$ and $C(v) = L_y(v) := L(y,v)$.



Answer the following:

Hint: (1) If no parents for that node, just leave it blank. (2) Use "w" for greek letter "ω". (3) Use g1,g2... for g_1, g_2....

1. [4 pts] What are the parents of:
ω: _____ help (formulas)
b: _____ help (formulas)
u: _____ help (formulas)
v: _____ help (formulas)
C: _____ help (formulas)

2. [2 pts] Given $u, v, g_1(s) = \frac{d\sigma}{du}(s)$ and $g_2(s) = \frac{dL_y}{dv}(s)$, then $\frac{dC}{du}(u)$ can be expressed as _____ help (formulas)

3. [4 pts] Given $\omega, b, u, g_3(s) = \frac{dC}{du}(s), g_4(r,s) = \frac{\partial u}{\partial b}(r,s)$ and $g_5(r,s) = \nabla_\omega u(r,s)$, then $\frac{\partial C}{\partial b}(\omega,b)$ = _____ and $\nabla_\omega C(\omega,b)$ = _____ help (formulas)

Answer(s) submitted:

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-
- `w,b`
- `u`
- `v`
- `g1(u)*g2(v)`
- `g3(u)*g4(w,b)`
- `g3(u)*g5(w,b)`

(correct)