

CSE 250B Quiz 4

Tuesday February 4, 2014

Instructions. Do this quiz in partnership with exactly one other student. Write both your names at the top of this page. **Circle one name that we will call out when we return the quiz. Choose a first name or last name that is likely to be unique in the class.**

Discuss the answer to the question with each other, and then write your joint answer below the question. Use the back of the page if necessary. It is fine if you overhear what other students say, because you still need to decide if they are right or wrong. You have seven minutes. The maximum score is three points.

Question. The backward vector $\beta(u, k)$ is the total unnormalized probability of all tag subsequences in position k to position n that begin with tag value u . Using the recursive definition in the lecture notes, show that

$$\log \beta(u, n) = \sum_{j=1}^J w_j f_j(u, \text{STOP}, \bar{x}, n+1).$$

Answer. The recursive case is $\beta(u, k) = \sum_v [\exp g_{k+1}(u, v)] \beta(v, k+1)$ and the base case is $\beta(u, n+1) = I(u = \text{STOP})$. Therefore

$$\beta(u, n) = \sum_v [\exp g_{n+1}(u, v)] \cdot \beta(v, n+1).$$

The terms in the sum are zero except when $v = \text{STOP}$. The g_{n+1} function is $g_j(y_n, y_{n+1}) = \sum_{j=1}^J w_j f_{n+1}(y_n, y_{n+1}, \bar{x}, n+1)$ so

$$\log \beta(u, n) = g_{n+1}(u, \text{STOP}) = \sum_{j=1}^J w_j f_j(u, \text{STOP}, \bar{x}, n+1).$$

Note. In the actual quiz distributed on February 4, there was an error in the equation in the question. The subscript of f_j was erroneously $n+1$ instead of j . Anyone who pointed this out will get an extra point. Points will not be deducted for an incorrect answer that relies on the erroneous subscript.