

③ [15 pts] Consider the following sentence:

they mournfully bark at the fair light moon

and an order-1 HMM for Part-of-Speech tagging with the following parameters (not exhaustive, but no missing information to solve the question):

they: Pron: $2.1 \cdot 10^{-5}$
 mournfully: Adv: $3.2 \cdot 10^{-5}$
 bark: N: $2.5 \cdot 10^{-5}$, V: $1.4 \cdot 10^{-5}$
 at: Prep: $3.7 \cdot 10^{-5}$
 the: Det: $4.5 \cdot 10^{-5}$
 fair: Adj: $3 \cdot 10^{-5}$, Adv: 10^{-5} , N: $2 \cdot 10^{-5}$
 light: Adj: $5 \cdot 10^{-5}$, N: $3 \cdot 10^{-5}$, V: $7 \cdot 10^{-5}$
 moon: N: $1.6 \cdot 10^{-5}$

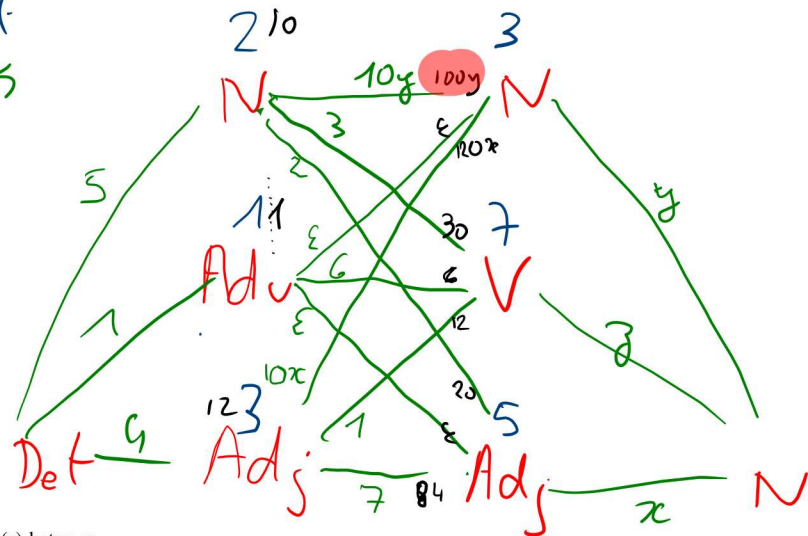
	Adj	Adv	Det	N	Prep	Pron	V
Adj	0.7	0.02	0.01	x	0.04	0.03	0.1
Adv	0.002	0.08	0.09	0.001	0.07	0.06	0.6
Det	0.4	0.1	0	0.5	0	0	0
N	0.2	0.05	0.02	y	0.15	0.08	0.3
Prep	0.1	0.06	0.4	0.18	0	0.16	0.1
Pron	0.1	0.3	0	0.2	0	0	0.4
V	0.14	0.16	0.13	z	0.15	0.11	0.12

(a) [10 pts] Assume that $5y > 6x$. Provide the tightest possible condition(s) between x , y and z so that the tag of "light" in the most probable sequence of tags for the above sentence is N.

(b) [5 pts] If these conditions are fulfilled, what is the most probable sequence of tags for the above sentence?

Fully justify your answers (most of the points are for the justifications.)

emit
trans



CBOW

$$P(w_i | v_{i-k} \dots w_{i-1} w_{i+1} \dots w_{i+k})$$

skip gram

$$P(w_{i-k} \dots w_{i-1} w_{i+1} \dots w_{i+k} | w_i)$$

$$\prod_j P(w_{i-j} | w_i)$$

