

1. Consider Hidden Markov Model. The hidden states are  $\{\omega_1, \omega_2, \omega_3\}$ , and the visible states are  $\{v_1, v_2, v_3\}$ . The transition probabilities are

$$a_{ij} = \begin{bmatrix} 1 & 0 & 0 \\ 0.3 & 0.3 & 0.4 \\ 0.2 & 0.4 & 0.4 \end{bmatrix}, \quad b_{jk} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0.6 & 0.4 \\ 0 & 0.2 & 0.8 \end{bmatrix}.$$

The initial hidden state is  $\omega_2$ , and initial visible state is  $v_2$ . Try to get the probability to generate the particular visible sequence  $V^3 = \{v_2, v_3, v_1\}$ .

解:

	v2	v3	v1
$\omega_1$	0	0	0.1
$\omega_2$	1	0.12	0
$\omega_3$	0	0.32	0
t	1	2	3

由上表可得观测到  $V^3 = \{v_2, v_3, v_1\}$  的概率为 0.1

隐状态可能的序列为

(1)  $\omega_2 \rightarrow \omega_2 \rightarrow \omega_1$  概率为  $1 \times 0.3 \times 0.4 \times 0.3 \times 1 = 0.036$

(2)  $\omega_2 \rightarrow \omega_3 \rightarrow \omega_1$  概率为  $1 \times 0.4 \times 0.8 \times 0.2 \times 1 = 0.064$

所以隐状态最可能的序列为  $\omega_2 \rightarrow \omega_3 \rightarrow \omega_1$

2. 当你在数据中发现噪声时，你将在 k-NN 中考虑以下哪个选项？

A) 增加 k 的值

B) 减少 k 的值

C) 噪声不能取决于 k

D) 这些都不是

A