

Assume $X_i \in \{0, 1\}$

$Y_i \in \{1, 2, 3\}$

DATA:

X	0	0	0	0	1	1	1	1	1	0
Y	1	2	1	1	2	3	2	3	3	1

Assume $X_0 = 0$

Unknowns: P : 2×2 matrix

Q : 2×3 matrix

$$Q_{ij} = P_2(Y_s = j | X_s = i)$$

$X \rightarrow X$	0	1
0	3	1
1	1	4

$X \rightarrow Y$	1	2	3
0	4	1	0
1	0	2	3