HMM example

Helen Yannakoudakis and Oana Cocarascu

Department of Informatics
King's College London

Parameter estimation of HMM parameters A, B

(s_0)	F	F	F	F	L	L	L	F	F	F	F	L	L	L	L	F	F	F	L	L	(s_f)
(k_0)	1	3	4	5	6	6	5	1	2	3	1	4	3	5	4	1	2	6	1	2	(k_f)

- Transition matrix A consists of transition probabilities a_{ij}

$$a_{ij} = P(X_{t+1} = s_j | X_t = s_i) \sim \frac{count_{trans}(X_t = s_i, X_{t+1} = s_j)}{count_{trans}(X_t = s_i)}$$

- Emission matrix B consists of emission probabilities $b_i(k_j)$

$$b_i(k_j) = P(O_t = k_j | X_t = s_i) \sim \frac{count_{emission}(O_t = k_j, X_t = s_i)}{count_{emission}(X_t = s_i)}$$

Emission probabilities	k0	1	2	3	4	5	6	kf
F	0.00	0.36	0.18	0.18	0.09	0.09	0.09	0.00
L	0.00	0.11	0.11	0.11	0.22	0.22	0.22	0.00
s0	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

Transition probabilities	to F	to L	to s0	to sf
From s0	1.00	0.00	0.00	0.00
From F	0.73	0.27	0.00	0.00
From L	0.22	0.67	0.00	0.11
From sf	0.00	0.00	0.00	0.00

Parameter estimation of HMM parameters A, B

(s_0)	F	F	F	F	L	L	L	F	F	F	F	L	L	L	L	F	F	F	L	L	(s_f)
(k_0)	1	3	4	5	6	6	5	1	2	3	1	4	3	5	4	1	2	6	1	2	(k_f)

- Transition matrix A consists of transition probabilities a_{ij}

$$a_{ij} = P(X_{t+1} = s_j | X_t = s_i) \sim \frac{count_{trans}(X_t = F, X_{t+1} = L)}{count_{trans}(X_t = F)}$$

- Emission matrix B consists of emission probabilities $b_i(k_j)$

$$b_i(k_j) = P(O_t = k_j | X_t = s_i) \sim \frac{count_{emission}(O_t = k_j, X_t = s_i)}{count_{emission}(X_t = s_i)}$$

Emission probabilities	k0	1	2	3	4	5	6	kf
F	0.00	0.36	0.18	0.18	0.09	0.09	0.09	0.00
L	0.00	0.11	0.11	0.11	0.22	0.22	0.22	0.00
s0	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

Transition probabilities	to F	to L	to s0	to sf
From s0	1.00	0.00	0.00	0.00
From F	0.73	0.27	0.00	0.00
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Parameter estimation of HMM parameters A, B

(s_0)	F	F	F	F	L	L	L	F	F	F	F	L	L	L	L	F	F	F	L	L	(s_f)
(k_0)	1	3	4	5	6	6	5	1	2	3	1	4	3	5	4	1	2	6	1	2	(k_f)

- Transition matrix A consists of transition probabilities a_{ij}

$$a_{ij} = P(X_{t+1} = s_j | X_t = s_i) \sim \frac{count_{trans}(X_t = F, X_{t+1} = L)}{count_{trans}(X_t = F)}$$

- Emission matrix B consists of emission probabilities $b_i(k_j)$

$$b_i(k_j) = P(O_t = k_j | X_t = s_i) \sim \frac{count_{emission}(O_t = 6, X_t = L)}{count_{emission}(X_t = L)}$$

Emission probabilities	k0	1	2	3	4	5	6	kf
F	0.00	0.36	0.18	0.18	0.09	0.09	0.09	0.00
L	0.00	0.11	0.11	0.11	0.22	0.22	0.22	0.00
s0	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sf	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

Transition probabilities	to F	to L	to s0	to sf
From s0	1.00	0.00	0.00	0.00
From F	0.73	0.27	0.00	0.00
From L	0.22	0.67	0.00	0.11
From sf	0.00	0.00	0.00	0.00