We want a_{ij}^{new} = new estimate of $P(q_{t+1} = s_j \mid q_t = s_i)$

λ_{old}) ? params of old HMM

Also estimate estimate

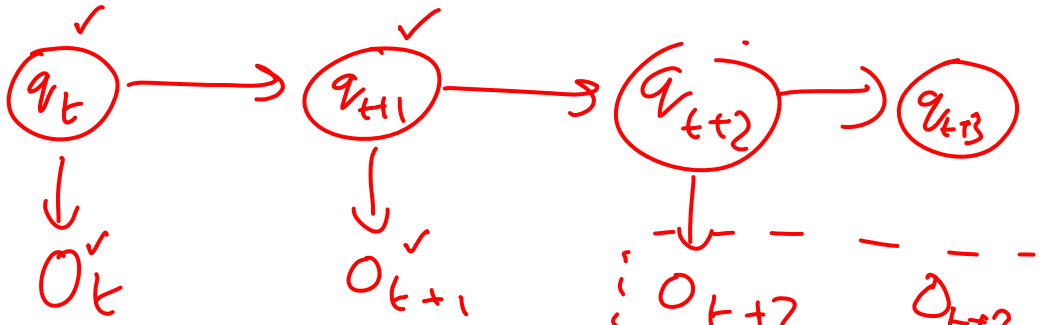
$b_j(O=k)$ = new est of $P(O_t = k \mid q_t = s_j)$

$$P(q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_T \mid \lambda^{old})$$

$$= P(O_{t+2} \cdots O_T \mid q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_{t+1}) \; P(q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_{t+1})$$

$$P(O_{t+2} \cdots O_T \mid q_{t+1} = j)$$

$$\beta_{t+1}(j)$$



$$P(A \wedge B) = P(A \mid B) P(B)$$

$$\alpha_t(i) = P(q_t = S_i \wedge O_1 \cdots O_t)$$

$$\beta_t(j) = P(O_{t+1} \cdots O_T \mid q_t = S_j)$$

$$P(q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_T \mid \lambda^{old})$$

$$= P(O_{t+2} \cdots O_T \mid q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_{t+1}) \; P(q_t = i \wedge q_{t+1} = j \wedge O_1 \cdots O_{t+1})$$

$$P(O_{t+2} \cdots O_T \mid q_{t+1} = j)$$

$$\beta_{t+1}(j)$$

$$\alpha_t(i) = P(q_t = S_i \wedge O_1 \cdots O_t)$$

$$\beta_t(j) = P(O_{t+1} \cdots O_T \mid q_t = S_j)$$