

$$\mathbf{P}(t) = \begin{pmatrix} P(y(t) = A|y(0) = A) \dots P(y(t) = A|y(0) = T) \\ P(y(t) = G|y(0) = A) \dots P(y(t) = G|y(0) = T) \\ P(y(t) = C|y(0) = A) \dots P(y(t) = C|y(0) = T) \\ P(y(t) = T|y(0) = A) \dots P(y(t) = T|y(0) = T) \end{pmatrix}$$