CORPUS

Alice/NNP ate/VB an/AT apple/NNP ./.
Mike/NNP likes/VB an/AT orange/NNP ./.
An/AT apple/NNP is/VB red/JJ ./.

NNP	Proper noun, singular
VB	Verb
AT	Article
JJ	Adjective
.	period

Approximations for HMM

$$
\begin{aligned}
&\arg\max_{c_1 \ldots c_T} P(c_1 \ldots c_T | F_1 \ldots F_T) \\
&= \arg\max_{c_1 \ldots c_T} \frac{P(c_1 \ldots c_T) P(F_1 \ldots F_T | c_1 \ldots c_T)}{P(F_1 \ldots F_T)} \\
&= \arg\max_{c_1 \ldots c_T} P(c_1 \ldots c_T) P(F_1 \ldots F_T | c_1 \ldots c_T) \\
&\cong \arg\max_{c_1 \ldots c_T} \left[\prod_{i=1}^{T} P(c_i | c_{i-1}) \times \prod_{i=1}^{T} P(F_i | c_i) \right] \\
&= \arg\max_{c_1 \ldots c_T} \prod_{i=1}^{T} P(c_i | c_{i-1}) P(F_i | c_i)
\end{aligned}
$$

HMM state diagram