

	Call	NoCall	End
Start	0.7	0.3	0
Call	0.2	0.7	0.1
NoCall	0.7	0.2	0.1

State transition probabilities

	St	Near	Far
Start	1	0	0
Call	0	0.7	0.3
NoCall	0	0.4	0.6

Emission probabilities

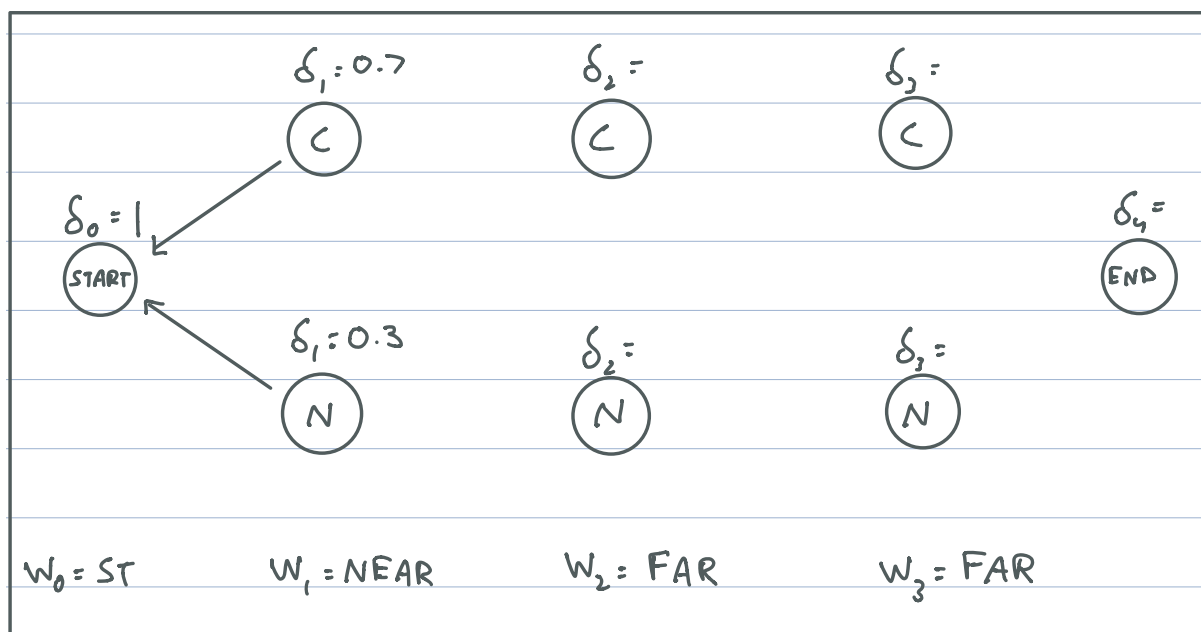


$$\begin{aligned}
 \delta_1(C) &= \max \{ P(C|START) P(w_0|START) \delta_0(START) \} \\
 &= \max \{ 0.7 \times 1 \times 1 \} \\
 &= 0.7
 \end{aligned}$$

$$\Rightarrow \boxed{\Psi_1(C) = START}$$

$$\begin{aligned}
 \delta_1(N) &= \max \{ P(N|START) P(W_0|START) \delta_0(START) \} \\
 &= \max \{ 0.3 \times 1 \times 1 \} \\
 &= 0.3
 \end{aligned}$$

$$\Rightarrow \boxed{\Psi_1(N) = START}$$

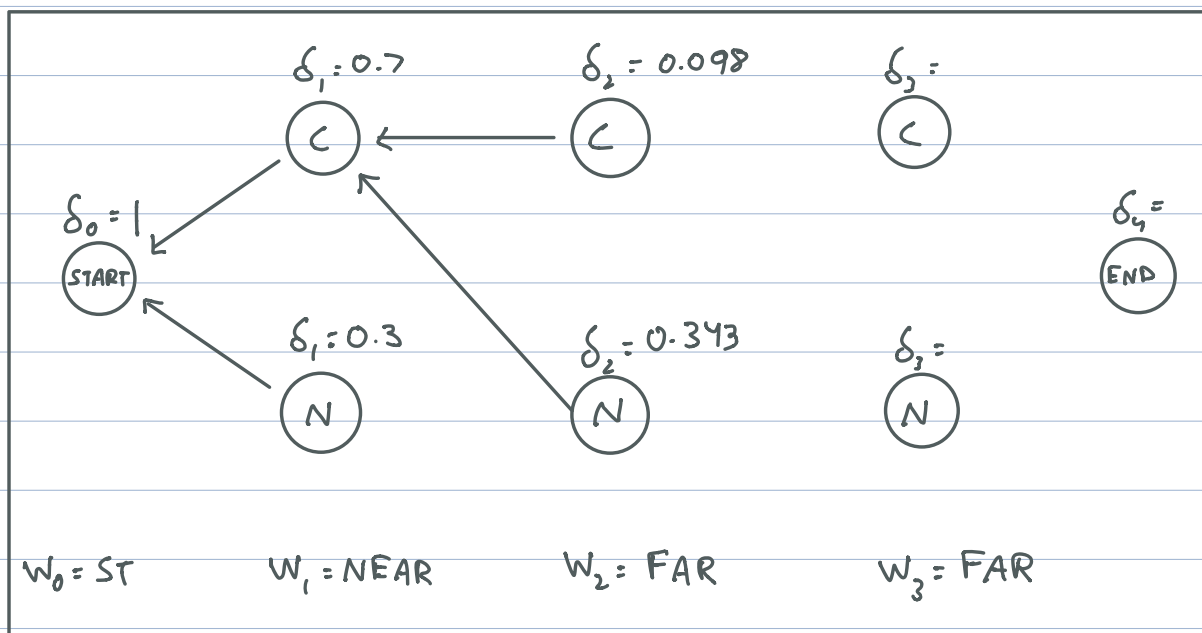


$$\begin{aligned}
 \delta_2(C) &= \max \{ P(C|C) P(W_1|C) \delta_1(C), \\
 &\quad P(C|N) P(W_1|N) \delta_1(N) \} \\
 &= \max \{ 0.2 \times 0.7 \times 0.7, 0.7 \times 0.4 \times 0.3 \} \\
 &= \max \{ 0.098, 0.084 \} \\
 &= 0.098
 \end{aligned}$$

$$\Rightarrow \boxed{\Psi_2(C) = C}$$

$$\begin{aligned} \delta_2(N) &= \max \left\{ P(N|C) P(W_1|C) \delta_1(C), \right. \\ &\quad \left. P(N|N) P(W_1|N) \delta_1(N) \right\} \\ &= \max \{ 0.7 \times 0.7 \times 0.7, 0.2 \times 0.4 \times 0.3 \} \\ &= \max \{ 0.343, 0.024 \} \\ &= 0.343 \end{aligned}$$

$$\Rightarrow \boxed{\Psi_2(N) = C}$$

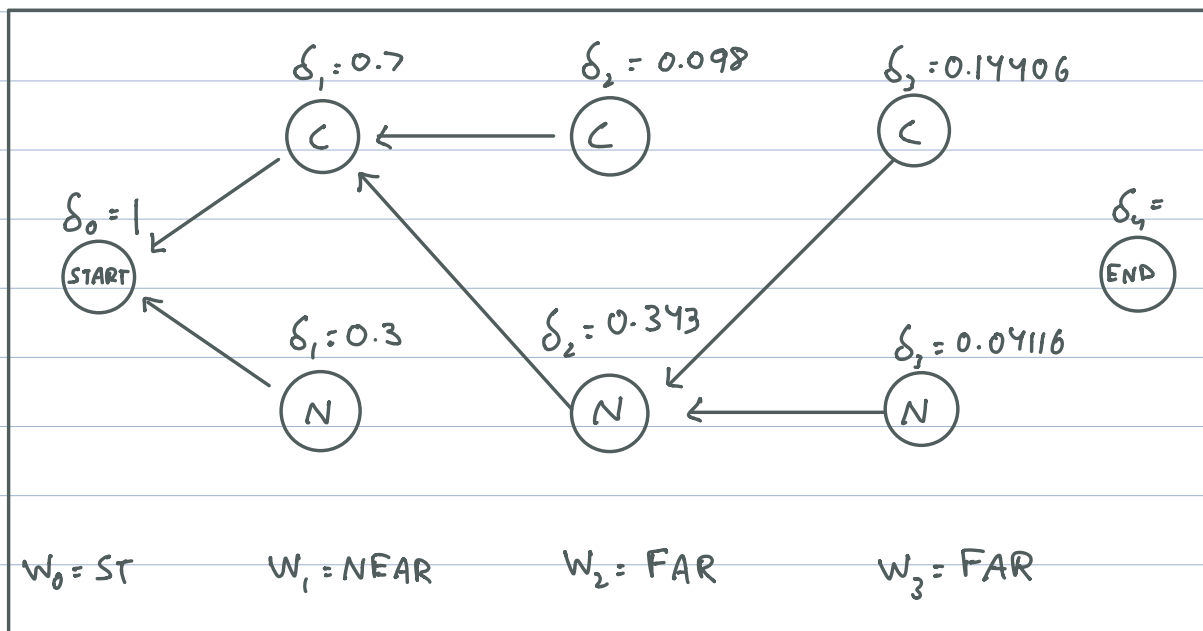


$$\begin{aligned}
 \delta_3(C) &= \max \left\{ P(C|C) P(W_2|C) \delta_2(C), \right. \\
 &\quad \left. P(C|N) P(W_2|N) \delta_2(N) \right\} \\
 &= \max \left\{ 0.2 \times 0.3 \times 0.098, 0.7 \times 0.6 \times 0.343 \right\} \\
 &= \max \{ 0.00588, 0.14406 \} \\
 &= 0.14406
 \end{aligned}$$

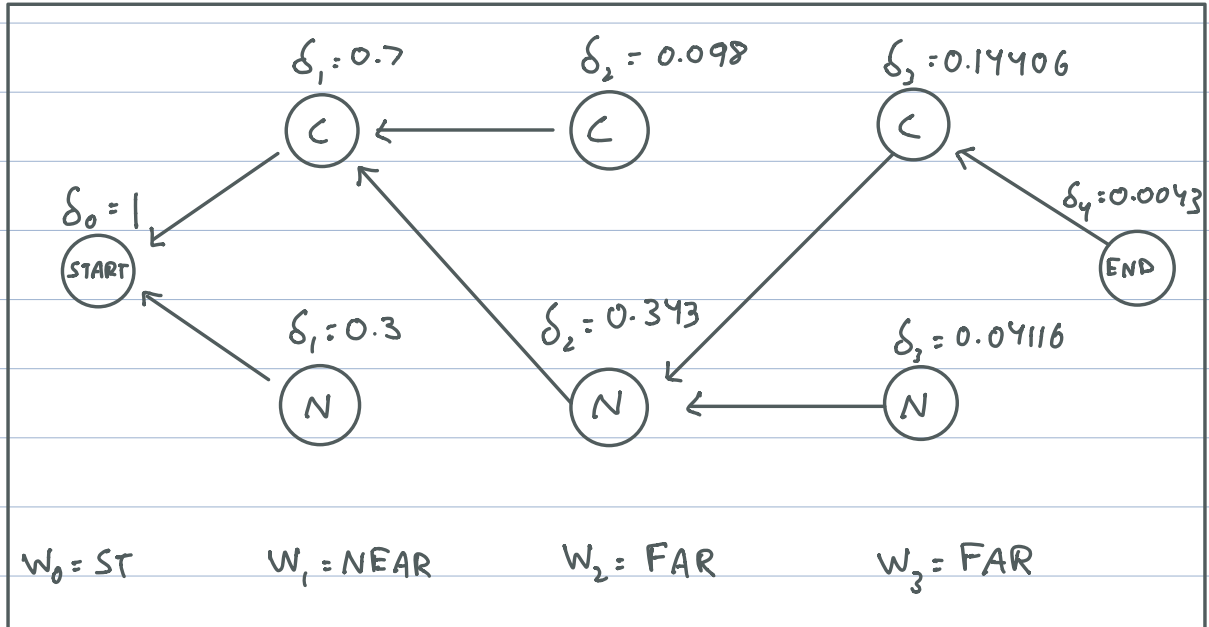
$$\Rightarrow \Psi_3(C) = N$$

$$\begin{aligned}
 \delta_3(N) &= \max \left\{ P(N|C) P(W_2|C) \delta_2(C), \right. \\
 &\quad \left. P(N|N) P(W_2|N) \delta_2(N) \right\} \\
 &= \max \left\{ 0.7 \times 0.3 \times 0.098, 0.2 \times 0.6 \times 0.343 \right\} \\
 &= \max \{ 0.02058, 0.04116 \} \\
 &= 0.04116
 \end{aligned}$$

$$\Rightarrow \Psi_3(N) = N$$



$$\begin{aligned}
 \delta_4(\text{END}) &= \max \left\{ P(\text{END} | C) P(W_3 | C) \delta_3(C), \right. \\
 &\quad \left. P(\text{END} | N) P(W_3 | N) \delta_3(N) \right\} \\
 &= \max \{ 0.1 \times 0.3 \times 0.14906, 0.1 \times 0.6 \times 0.04116 \} \\
 &= \max \{ 0.00432, 0.0024 \} \\
 &= 0.00432 \\
 &\Rightarrow \boxed{\Psi_4(\text{END}) = C}
 \end{aligned}$$



VITERBI SEQUENCE = < CALL, NO CALL, CALL >

$$P(\langle \text{CALL}, \text{NO CALL}, \text{CALL} \rangle | \langle \text{NEAR}, \text{FAR}, \text{FAR} \rangle) = 0.00432$$