

להלן תיאור מודל HMM:

למודל 4 מצבים.

המצב הרביעי הוא מצב פיקטיבי, ומעבר אליו גורם לסיום התהליך.

$$\Pi_1 = 1.0$$

$$a_{1 \rightarrow 1} = a_{2 \rightarrow 2} = a_{3 \rightarrow 3} = 0.8$$

$$a_{1 \rightarrow 2} = a_{2 \rightarrow 3} = a_{3 \rightarrow 4} = 0.2$$

$$b_1(+) = 0.8 \quad b_1(-) = 0.2$$

$$b_2(+) = 0.2 \quad b_2(-) = 0.8$$

$$b_3(+) = 0.8 \quad b_3(-) = 0.2$$

נתון רצף התצפיות:

$$O_0 \dots O_T = -++-+$$

4					Pr=0.0004194304 Point to 3
3	Pr=0	Pr=0	Pr=0.00128 Point to 2	Pr=0.000256 Point to 2/3	Pr=0.002097152 Point to 2
2	Pr=0	Pr=0.008 Point to 1	Pr=0.00512 Point to 1	Pr=0.0131072 Point to 1	Pr=0.002097152 Point to 2
1	Pr=0.2	Pr=0.128 Point to 1	Pr=0.08192 Point to 1	Pr=0.0131072 Point to 1	Pr=0.008772608 Point to 1
	-	+	+	-	+

First column:

$$\Pr(i,0) = \Pi(i) * b_i(O_0)$$

Next columns:

$$\Pr(i,j) = b_j(O_j) * \max \{ \Pr(k,j-1) * a_{k \rightarrow i} \} // \text{maximization is done over all possible } k$$

$$\Pr(1,1) = 0.8 * \max\{0.2*0.8, 0, 0\} = 0.128, \text{ pointer to 1}^{\text{st}} \text{ state.}$$

$$\Pr(2,1) = 0.2 * \max\{0.2*0.2, 0, 0\} = 0.008, \text{ pointer to 1}^{\text{st}} \text{ state}$$

$$\Pr(3,1) = 0.8 * \max\{0, 0, 0\} = 0$$

$$\Pr(1,2) = 0.8 * \max\{0.128*0.8, 0, 0\} = 0.08192, \text{ pointer to 1}^{\text{st}} \text{ state.}$$

$$\Pr(2,2) = 0.2 * \max\{0.128*0.2, 0.008*0.8, 0\} = 0.00512, \text{ pointer to 1}^{\text{st}} \text{ state}$$

$$\Pr(3,2) = 0.8 * \max\{0, 0.008*0.2, 0\} = 0.00128, \text{ pointer to 2}^{\text{nd}} \text{ state}$$

$$\Pr(1,3) = 0.2 * \max\{0.08192*0.8, 0, 0\} = 0.0131072, \text{ pointer to 1}^{\text{st}} \text{ state.}$$

$$\Pr(2,3) = 0.8 * \max\{0.08192*0.2, 0.00512*0.8, 0\} = 0.0131072, \text{ pointer to 1}^{\text{st}} \text{ state}$$

$$\Pr(3,3) = 0.2 * \max\{0, 0.00512*0.2, 0.00128*0.8\} = 0.000256, \text{ pointer to 2}^{\text{nd}}/3^{\text{rd}} \text{ state}$$

$$\Pr(1,4) = 0.8 * \max\{0.0131072*0.8, 0, 0\} = 0.008772608, \text{ pointer to 1}^{\text{st}} \text{ state.}$$

$$\Pr(2,4) = 0.2 * \max\{0.0131072*0.2, 0.0131072*0.8, 0\} = 0.002097152, \text{ pointer to 2}^{\text{nd}} \text{ state}$$

$$\Pr(3,4) = 0.8 * \max\{0, 0.0131072*0.2, 0.000256*0.8\} = 0.002097152, \text{ pointer to 2}^{\text{nd}} \text{ state}$$

$$\Pr(4,4) = 0.2 * \Pr(3,4) = 0.0004194304$$

Best path: 1,1,1,2,3

Probability: 0.0004194304