Exercise 2 TDT4171 Sondre Foslien

February 27, 2018

Part A

1. Unobserved variables: $\mathbf{X_t} = Rain_t$

2. Observed variables: $\mathbf{E_t} = Umbrella_t$

3. Using what's given in figure 15.2

Dynamic model: $\mathbf{P}(\mathbf{X_t}|\mathbf{X_{t-1}}) = \begin{bmatrix} 0.7 & 0.3 \\ 0.3 & 0.7 \end{bmatrix}$

Observation model: $\mathbf{P}(\mathbf{E_t}|\mathbf{X_t}) = \begin{bmatrix} 0.9 & 0 \\ 0 & 0.2 \end{bmatrix}$

4. It's assumed that rain today is only dependent on if it rained yesterday. This is not true but might still give ut a approximatin on how rain works.

Part B

The normalized forward messages $\mathbf{f}_{1:k}$:

Day	True	False
1	0.892	0.108
2	0.896	0.104
3	0.194	0.806
4	0.732	0.268
5	0.868	0.132

Part C

The normalized forward messages $\mathbf{b}_{k+1:t}$:

Day	True	False
1	0.867	0.133
2	0.820	0.180
3	0.307	0.693
4	0.820	0.180
5	0.867	0.133