

1 Filtering (10 points)

In the Umbrella problem, suppose that the observations for the first three days are $U_1 = false$, $U_2 = false$, $U_3 = true$. What is the belief state at time 3: $\mathbf{P}(R_3|U_{1:3})$?

2 Smoothing (10 points)

Continuing from problem 1. Now suppose that we observe $U_4 = true$. What is our updated belief about the rain at time 3: $\mathbf{P}(R_3|U_{1:4})$?

3 HMM and Viterbi (20 points)

Work Problem 15.12 in the textbook. Let S_t be the state at time t . At time 1, $P(S_1 = Onset) = 1$ and at time 8, $P(S_8 = FINAL) = 1$.

You should draw the “trellis” showing the possible paths through the HMM.