

Project 4 – HMMs and Dice

Consider a casino game, where the dealer is a three-sided dice with labels 1, 2, and 3. The dealer has three loaded dice $D_1 D_2 D_3$. For die D_i , the probability of rolling the number j is p_{ij} . At each turn, the dealer must decide whether to: (1) keep the same die; (2) switch to one of the other two dice randomly. She chooses (1) with probability p and (2) with probability $1-p$. At the beginning the dealer chooses a dice with equal probability.

- a) Give an HMM for this situation. Specify the alphabet, the states, the transition probabilities and the emission probabilities.
- b) Suppose that you observe the following sequence of die rolls: X
- c) Find a sequence of states which best explains the sequence of rolls. What is the probability of this sequence?

Structure of the Input File

All lines that begin with # (hash/pound sign) are comments and can be ignored.

First Line of the file has probability of switching dice.

p

Next 3 lines of the input file have:

p_{11}, p_{12}, p_{13}

p_{21}, p_{22}, p_{23}

p_{31}, p_{32}, p_{33}

Then, there is X , which is a list of 100 labels 1,2,3 corresponding to the emissions (observations).

Which Input file to Use

Use the input file that corresponds to the last digit of your GWID (0-9). Files are called Input0.txt to Input9.txt.