

Sheet 5

Free University of Berlin, WS 2007/08
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Assignments for the lecture PSSA
working period: 28.11.2007 - 05.12.2007

Exercise 12 (Weather in the land of Oz (from Kemeny & Snell, 1960)). We consider the magical Land of Oz where the weather follows a very predictable pattern. If it is raining today, then there is a 50% chance of raining again tomorrow, and a 25% chance of either having a nice day or a snowy day tomorrow. Similarly if it is snowing, we have a 50% chance of again having snow, and a 25% chance of either having a nice day, or a rainy day. Also in the land of Oz they never have two nice days in a row, and they equally have rain and snow the day after a nice day.

1. Write the transition matrix Π and compute Π^4
2. What is the probability that it will rain in two days, knowing that today is rainy ?
3. What is the probability of four days of rain in a row, following a rainy day.
4. Compute the stationary distribution μ .

Exercise 13 (A little more on finite Markov chain imbedding). Consider the word 'abba' on a 2 letters alphabet, and suppose that the sequences are generated by an order 1 markov model.

1. Write the transition matrices obtained by FMCI for
 - the 1st occurrence of a word.
 - the N th occurrence of a word.
2. Could the hypothesis be relaxed and the model supposed non homogeneous (i.e. with a transition matrix depending on the position in the sequence) ? How could one compute a word statistic in this case ?