Advanced Statistical Learning in Bioinformatics
Bioinformatics Research Center   Asger Hobolth
Aarhus University   August 21, 2018

Handout 1

Course homepage and teachers

http://bb.au.dk/
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Book

Ewens and Grant (2005): *Statistical Methods in Bioinformatics. An Introduction. (2nd Edition).*
Springer, New York.

Lectures in Week 35

Monday, August 27 and Wednesday, August 29:
     Broad outline of course content.
     Background of course participants.
     Introduction to the first topic: Hidden Markov Models.
     Markov Chains
     EG Chapter 4.5-4.10 (Finite Markov chains): pages 161–170.
     EG Problem 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14.
     An alternative book on probability theory is:
       https://math.dartmouth.edu/~prob/prob/prob.pdf
     (Markov chains are covered in Chapter 11).

Lectures in Week 36

Monday, September 3, and Wednesday, September 5:
     Finite Markov Chain Imbedding (FCMI)
     Selected parts of the paper:
     Fu and Koutras (1994). Distribution theory of runs: A Markov chain approach. *Journal of the American Statistical Association*, **427**, 1050–1058.
     I will start by discussing why the paper is of interest to us!

Exercises in Week 35

Please note that it is important that you solve all exercises every week. For example you may need an exercise from an earlier week to solve a new exercise. The projects and exam may also involve using exercises from the handouts.
     Exercises this week:

(i) EG Problem 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14.

(ii) Beads of red, blue, green and yellow are connected together into a string of 15 beads. The beads are connected with the following rules: (a) Red beads can't be connected with green beads; (b) Blue beads can't be connected with neither green beads nor yellow beads.

1. Describe the rules with a matrix.

2. How many different forms of strings are there under the rules?

3. If you connect the string into a necklace, how many different forms are there?