Sequence Analysis SS 2013

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8. Exercise sheet, June 25th, 2013
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Exercise 1.

Nussinov SCFG

a) Formulate the inside and outside algorithm for the Nussinov SCFG.

b) Show how to use your inside and outside variables to calculate the probability that positions i and j are base-paired, summed over all structures.

Exercise 2.

Context free RNA grammars

Consider the hairpin loop CFG from the lecture:

1. Write derivations for s_1 = `CAGGAAACUG` and s_2 = `GCUGCAAAGC`.
2. Consider the complete language generated by the CFG from the lecture. Write a regular grammar that generates exactly the same language. Does this seem like a good idea?

Exercise 3.

CNF

Convert the production rule $W \rightarrow aWbWWc$ (a, b, c terminal symbols) into Chomsky normal form. If the probability of of the original production is p, show the probabilities for the productions in normal form.