

CSC 2427 Algorithms in Molecular Biology
PS3: Due April 14

Don't Panic

You may work with others on this homework assignment, but please submit your own writeup. You must acknowledge the contributions that other students make to your answers. Note: this homework may have bugs. If you spot something that looks wrong or is not clear please contact me, or post to the newsgroup: ut.cdf.csc2427h. Note that questions on the newsgroup will be answered **before** those sent by e-mail.

1. Structure Overview (25 pts)

Write a few lines about each topic. Writing more is neither required nor encouraged. The purpose of this question is to have you look at a few topics in protein folding which we did not discuss in lecture.

(a) In class we did not talk about Ramachandran plots. Discuss what they are.

(b) Which amino acids are hydrophobic and which ones are hydrophilic? What is the HP (hydrophilic/hydrophobic) model of protein folding?

2. ChainTree (25pts)

When simulating the folding of the protein we may want to randomly jump to some previous folding configuration which we have already examined: for example assume we have reached a local minimum in terms of the energy function and want to restart in a randomly chosen previous position. Design a variation of the ChainTree algorithm that will allow all operations to run in the same amount of time as previously, but will allow such random restarts. Your datastructure should use memory logarithmic in the length of the protein for every step of history that you are keeping.

3. Help the future (50pts)

For every problem that you did for this course (5 on problem set 1, 3 on problem set 2 and the two on this problem set please write a 3-4 line summary of whether you think this problem is useful for the class and helped you learn something. You are also welcome to write any other comments about the class which can help me improve it in the future. You can submit your answer to this problem anonymously into my box in Pratt 283. On your homework submission just indicate that you have submitted your answer to this question (I will rely on your honesty).