# Homework 1
# Colorado CSCI 5314

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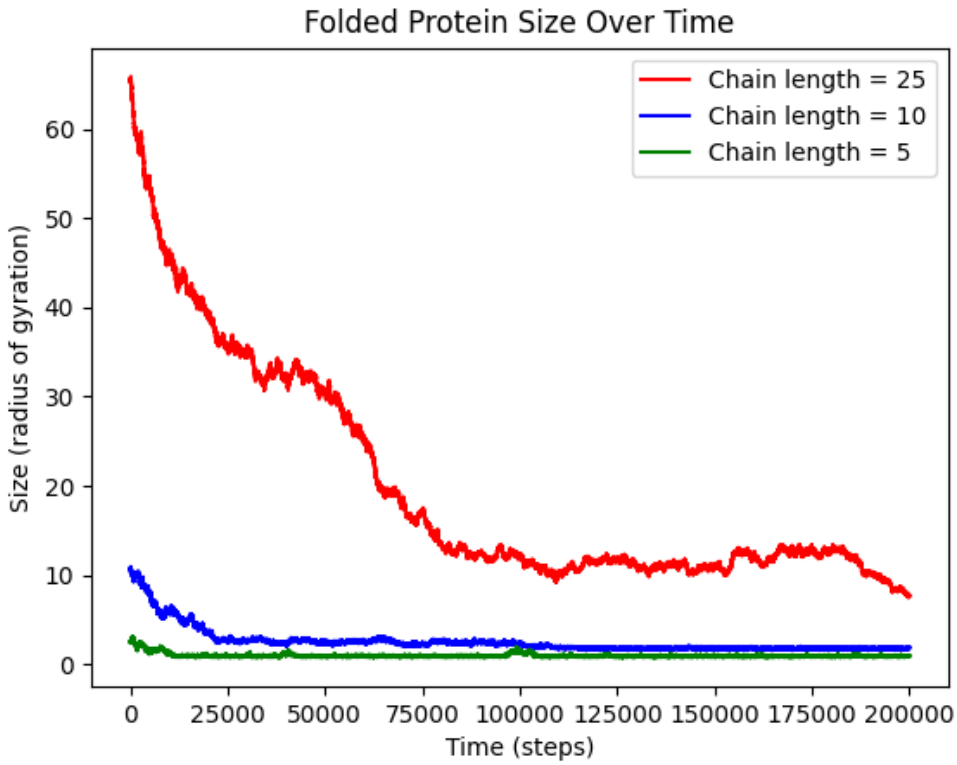
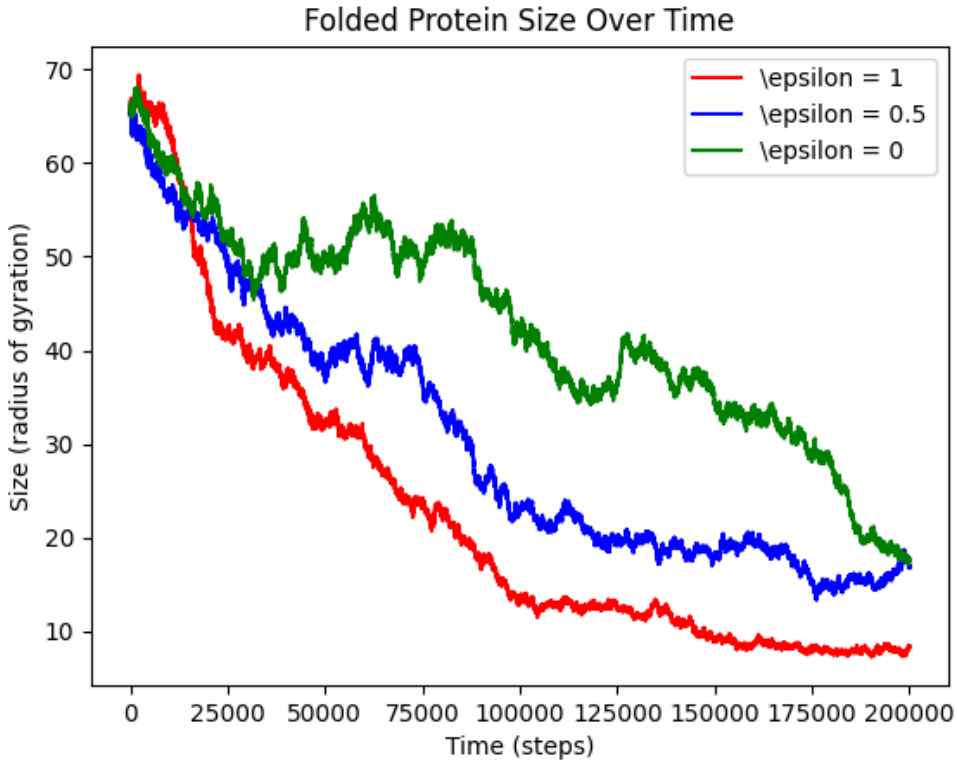
## Coarse Grained Simulation of a Protein

Below are the images from the simulations that were to be run. Code is available if desired, but Orit noted that only plots are required for this section.

### (1)



(2)


Folded Protein Size Over Time
\epsilon = 1
\epsilon = 0.5
\epsilon = 0
Size (radius of gyration)
70
60
50
40
30
20
10
0
25000
50000
75000
100000
125000
150000
175000
200000
Time (steps)

# Paper Review

## Main Contribution

This paper is centered around the idea of using DNA to form self-assembling nanostructures, specifically those periodic in design. The authors largely aim to show the possibilities of their methods to aid in the development of self-assembling nanotechnology, which they believe to be a hugely exploitable future technology (more on this in the last section of this review).

## Essential Principle Being Exploited

The authors use a certain type of DNA molecule (anti-parallel double-crossover, referred to as DX) for its rigidity and interactive controllability. These molecules (also consisting of a couple various sub-types of DX molecules) mimic a tiling model to form 2-D lattices (split into two groups, 2- and 4-component).

## Major Strength

The visual aids in the form of figures are excellent in supplementing the text, especially for readers that may find the text somewhat dense. That being said, I do think the authors do a fairly good job of explaining in plain English the ideas discussed, so that those that may lack necessary background knowledge are able to keep up.

## Weakness

I don't have much experience reading research papers of such topic matters, and can't seem to find any glaring weaknesses in the paper. I'd be very interested to see what issues others have raised about the paper, as I feel that the authors do a wonderful job of explaining a subject matter that could very easily confused many readers (I have little-to-no biology or chemistry background, and still feel that I have a decent grasp as to what is being discussed). I suppose one could possibly look into the citations/references (not on their validity, but on their applicability), but aside from that this paper seems to do a great job of accomplishing what it sets out to achieve.

## Future Work Direction

I don't necessarily believe it is the responsibility of this paper (or its authors) to extend its ideas into applications, but I do think the mentioning of further applicable ideas brings forth some great thoughts. Extending this work into three dimensions could prove even more useful in bringing it into further practical applications. Seeing how these ideas might affect the development of nanotechnology is an exciting prospect (or might have already, as this paper was written quite a few years ago).