Graduate Project – Genetic Algorithms for Bioinformatics Optimization

Biological Computation   
Spring 2017  
Due: May 8th

This is the additional project for CS515.

Genetic Algorithms, i.e. *in silico* evolution, has been applied to a number of optimization and modeling problems in bioinformatics. For example, genetic algorithms have been applied to the problems of:

1. Finding the structure of HMMs
2. Finding phylogenic relationships
3. Identifying specific regions within biological sequence data, such as:
   1. Identifying coding or non-coding regions in DNA
   2. Identifying ordered or disordered regions in protein sequences
4. Multiple sequence alignment
5. Reverse engineering regulatory networks
6. …

The goal of the graduate project is to research one of these application areas and write a mini-review paper. Ideally, the application area will be *related* to your current graduate research, but not what you are already doing. I.e. the goal is to investigate a potentially *new* (for your topic) avenue of research.

## Write-up

The paper should be about three pages long and should be based on at least three related research papers from your chosen topic area (i.e. a very mini-review). The paper should include the following:

1. A description of the problem
2. A description of the algorithm or algorithms being used to solve it
3. A critical examination and summary of the performance of the algorithm(s). This should include:
   1. Strengths and weaknesses of the algorithm(s)
   2. Under what conditions, types of data/problems the algorithms will be effective and when they won’t be effective
   3. Potential improvements to the algorithms