IT 468- Introduction to Natural Computation

Home Work 3

Computational DNA Self-Assembly

Due date: September 23, 2013

(1) Download the software xgrow from http://www.dna.caltech.edu/Xgrow/. Install and run it in Linux. Using the test data of .tiles files given in tilesets directory generate a table for different Gmc and Gse and temp t for files: BinaryCounter.tiles, Sierpinski2x2.tiles. Write your observations in terms of number of errors. Run it using block option. Attach the table in answer sheet.

    (**Hint:** Read the following paper "Simulations of Computing by Self-Assembly", Erik Winfree and Erik's PhD Thesis: Algorithmic Self-Assembly of DNA.)

(2) For tile sets BinaryCounterSquare.tiles, explain the .tile file and also find the functions if any to describe the tile set.

(3) Download and install the software Xtilemod from http://www.guptalab.org/xtilemod/. Try to generate tile set for doing different arithmetic operations of 2 integers and n integers. Try all options available in the software and after generating the .tiles file simulate it using xgrow. Explain one of them completely. Do the same for primality testing.

    (**Hint:** Read the paper http://arxiv.org/abs/1207.1161 and also read the manual given at http://www.guptalab.org/xtilemod/manual.pdf)

(4) Download and install the software ISU-TAS from http://www.cs.iastate.edu/~lnsa/software.html Take an example and compare it with other softwares.

    (**Hint:** Read the paper http://arxiv.org/abs/1101.5151 and read the technical report Author: Jangid, Pankaj Kumar (200701205) Title: Computational DNA Self Assembly, DA-IICT Library)

(5) Run the software Xtile 1.0 at http://www.guptalab.org/xtile. Generate some .tiles files and attach them.

    More information at http://phelafel.technion.ac.il/~tepper/main/project.html could be useful to you.)