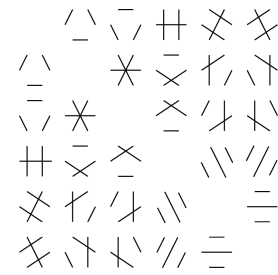


Mathematics Seminar



Rocky Mountain Algebraic Combinatorics Seminar

Algorithms for Genome Assembly and Analysis

Christina Boucher

Colorado State University (Computer Science)

Assemblies of next generation sequencing data, while accurate, still contain a substantial number of errors that need to be corrected after the assembly process. In the first half of this talk, I will present an algorithm that corrects errors, i.e., insertions, deletions, and substitutions in assembled contigs. Fundamental to our method is the positional de Bruijn graph, which is a graph structure that models k -mers within reads while incorporating the approximate positions of reads into the model. The algorithm reduced the number of small insertions and deletions in the assemblies of standard multi-cell *E. coli* data by almost half, and corrected between 30% the substitution errors. Further, we show the method is imperative to improving single-cell assembly, which is inherently more challenging due to higher error rates and non-uniform coverage; over half of the insertions, deletions, and substitutions in the single-cell assemblies were corrected. In the second half of this talk, I will present two algorithms for finding transcription factors in redundant sequences in genetic data that have important biological functions. Our algorithms are capable of detecting highly degenerate sequences that otherwise could not be detected by competing methods.

Equiangular lines and Seidel matrices with three eigenvalues

Sylvia Hobart

University of Wyoming

The maximum number of lines in R^n such that any pair form a constant angle was a favorite topic of J. J. Seidel, and it has connections with graphs, the Seidel matrix, and two-graphs. (Also, quantum information theory but I won't talk about that). Starting with some basics, this talk will describe some of these connections and show how Seidel matrices with three eigenvalues turn up in a natural way, based on recent work of Gary Greaves, Jack Koolen, Akihiro Munemasa, and Ferenc Szollosi.

Weber 223

4–6 pm

Friday, October 23, 2015

(Refreshments in Weber 117, 3:30–4 pm)

Colorado State University

This is a joint Denver U / UC Boulder / UC Denver / U of Wyoming / CSU seminar that meets biweekly.
Anyone interested is welcome to join us at a local restaurant for dinner after the talks.



Department of Mathematics
Fort Collins, Colorado 80523