MS19: Tensor Computations and Applications II

Equations for the Fifth Secant Variety of Segre Products of Projective Spaces

Luke Oeding, *Auburn University*

We describe a computational proof that the fifth secant variety of the Segre product of five copies of the projective line is a codimension 2 complete intersection of equations of degree 6 and 16. Our computations rely on pseudo-randomness, and numerical accuracy, so parts of our proof are only valid "with high probability". This is joint work with Steven Sam (UC Berkeley).

Eigenvectors of Non-Hermitian Random Matrices

Shannon Starr, *University of Alabama at Birmingham*

Largest and smallest singular values of non-Hermitian random matrices are important quantities for studying compressed sensing. Here we consider eigenvectors instead of singular values. There are many open questions.

Compressed Sensing in a Multilinear Sparse System of Genomic Interactions

Alexandra Fry, *University of Alabama at Birmingham*

The application of multilinear systems and compressed sensing on a biological model of viral replication will be discussed. This problem is motivated by the mathematical study of interactions among genes in cells. We show that a tensor restricted isometry property (TRIP) is necessary to find the unique sparse solution in the multilinear system. This solution can aid in drastically reducing the number of experiments needed to assess combinations of genes are necessary for viral replication.

Random Projections for Low Multilinear Rank Tensors

Carmeliza Navasca, *University of Alabama at Birmingham*

We proposed two randomized tensor algorithms for reducing multilinear ranks in the Tucker format. The basis of these randomized algorithms is from the randomized SVD of Halko, Martinsson and Tropp. Here we provide randomized versions of the higher order SVD and higher order orthogonal iteration. Moreover, we provide a sharper probabilistic error bounds for the matrix low rank approximation. Thus, we can provide theoretical error bounds for the tensor case. In addition, these randomized algorithms are implemented on an MRI dataset.