Matrix Diagonals

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I will discuss certain ideas related to the (nonzero) diagonals and diagonal hypergraph of a square matrix. Included will be a characterization of those bijections between the nonzeros (their positions) of two square matrices of the same order that are diagonal hypergraph isomorphisms. In addition I will discuss some connections between the diagonal hypergraph of a matrix and the polytope of doubly stochastic matrices and its simplex faces, ray-nonsingularity and determinantal regions of a matrix, and digraphs and bipartite graphs.