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Graphs on Surfaces and Computational Genomics

In topological graph theory, we consider ways of drawing graphs on surfaces without crossing lines. Attempting to draw permutation chord diagrams on orientable surfaces, we find a surprise: the 'genus' of a permutation is equal to the 'block interchange distance' from that permutation to the identity. Further study reveals that a similar notion of nonorientable genus for signed permutations, this time the 'double cut and join' (DCJ) distance appears. We discuss this correspondence, and how some familar results on DCJ factorizations appear from a topological point of view.