

Title: Determinant and permanent of a matrix using 2-connected components in the digraph

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Abstract:

For a square matrix, the determinant and the permanent are quite similar by definition, but computationally these are two extreme problems. The determinant is in P whereas the permanent is a #P-complete problem. From a graph theory perspective, the determinant is equivalent to counting the number of spanning trees in an undirected graph, and the permanent is equivalent to calculating the number of a perfect matching in a bipartite graph. In this talk, we will discuss how the determinant (permanent) of a matrix can be computed in terms of the determinant (permanent) of 2-connected components in the corresponding digraph. Under some conditions on the number of cut-vertices and block sizes, the computation beats the asymptotic complexities of the state of art methods.