

On Positive Matrices and Number of Paths in Directed Graphs

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Let $G = (V, E)$ be a directed (multi) graph, and let $A = A(G)$ denote the adjacency matrix of G . For every pair (u, v) of vertices and $l \geq 0$, consider the number $P_{u,v}(l)$ of paths of length l from u to v . We use algebraic properties of A (such as eigenvalues) in order to study the asymptotic behavior of $P_{u,v}(l)$. Some of these algebraic properties can be obtained by Perron-Frobenius theorem on positive matrices.

Finally, we present several applications of this to other problems (such as distribution problems in double recurrence sequences over finite fields).