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Perimeter preservers of nonnegative integer matrices

Abstract: We investigate the perimeter of nonnegative integer matrices. We also characterize the linear operators which preserve the rank and perimeter of nonnegative integer matrices. That is, a linear operator T preserves the rank and perimeter of rank-1 matrices if and only if it has the form $T(A) = P(A \circ B)Q$, or $T(A) = P(A^t \circ B)Q$ with appropriate permutation matrices P and Q and positive integer matrix B, where $\circ$ denotes Hadamard product.