

An alternate proof of the monotonicity of the number of positive entries in nonnegative matrix powers*

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Abstract

Let A be a nonnegative real matrix of order n and $f(A)$ denote the number of positive entries in A . In 2018, Xie proved that if $f(A) \leq 3$ or $f(A) \geq n^2 - 2n + 2$, then the sequence $(f(A^k))_{k=1}^{\infty}$ is monotone for positive integers k . In this note we give an alternate proof of this result by counting walks in a digraph of order n .

Keywords: Digraphs, walks, monotonicity, adjacency matrix.

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Alternativni dokaz monotonosti števila pozitivnih in negativnih matričnih potenc*

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Povzetek

Naj bo A nenegativna realna matrika reda n in naj $f(A)$ označuje število pozitivnih elementov v A . Leta 2018 je Xie dokazal, da če je $f(A) \leq 3$ ali $f(A) \geq n^2 - 2n + 2$, potem je zaporedje $(f(A^k))_{k=1}^{\infty}$ monotono za pozitivna cela števila k . V tem kratkem članku podamo alternativen dokaz tega rezultata, do katerega pridemo s preštevanjem sprehodov v digrafu reda n .

Ključne besede: Digrafi, sprehodi, monotonost, matrika sosednosti.

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