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A note on extremal results on directed acyclic graphs

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Abstract: This paper studies the maximum number of edges of a Directed Acyclic Graph (DAG) with n vertices in terms of its longest path ℓ . We prove that in general this number is the Turán number $t(n, \ell + 1)$, the maximum number of edges in a graph with n vertices without a clique of size $\ell + 2$. Furthermore, we find the maximum number of edges in a DAG which is either reduced, strongly reduced or extremely reduced and we relate this extremal result with the family of intersection graphs of families of boxes with transverse intersection.

Keywords: Directed graphs, Turán numbers, intersection graphs of families of boxes.

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Opomba o ekstremalnih rezultatih o usmerjenih acikličnih grafih

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Povzetek: Ta članek obravnava maksimalno število povezav usmerjenega acikličnega grafa (UAG) z n vozlišči glede na njegovo najdaljšo pot ℓ . Dokažemo, da je v splošnem to število Turánovo število $t(n, \ell + 1)$, maksimalno število povezav v grafu z n vozlišči brez klike velikosti $\ell + 2$. Nadalje, poiščemo maksimalno število povezav v UAG, ki je bodisi reduciran, krepko reduciran ali ekstremno reduciran. Ta ekstremalni rezultat povežemo z družino presečnih grafov družin škatel s transverzalnimi preseki.

Ključne besede: Usmerjeni grafi, Turánova števila, presečni grafi družin škatel.

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