A note on the neighbour-distinguishing index of digraphs

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Abstract

In this note, we introduce and study a new version of neighbour-distinguishing arc-colourings of digraphs. An arc-colouring γ of a digraph D is proper if no two arcs with the same head or with the same tail are assigned the same colour. For each vertex u of D, we denote by $S_\gamma^-(u)$ and $S_\gamma^+(u)$ the sets of colours that appear on the incoming arcs and on the outgoing arcs of u, respectively. An arc colouring γ of D is *neighbour-distinguishing* if, for every two adjacent vertices u and v of D, the ordered pairs $(S_\gamma^-(u), S_\gamma^+(u))$ and $(S_\gamma^-(v), S_\gamma^+(v))$ are distinct. The neighbour-distinguishing index of D is then the smallest number of colours needed for a neighbour-distinguishing arc-colouring of D.

We prove upper bounds on the neighbour-distinguishing index of various classes of digraphs.

Keywords: Digraph, arc-colouring, neighbour-distinguishing arc-colouring.

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O indeksu razlikovanja sosedov v digrafih

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Povzetek

V tem članku vpeljemo in preučujemo novo različico barvanja lokov v digrafih, ki razlikuje sosede. Barvanje lokov γ digrafa D je pravilno, če nobenima dvema lokoma z istim koncem ali z istim začetkom ni dodeljena ista barva. Za vsako vozlišče u digrafa D označimo z $S_\gamma^-(u)$ in $S_\gamma^+(u)$ množici barv, ki nastopata na vhodnih lokih in na izhodnih lokih vozlišča u. Barvanje lokov γ digrafa D *razlikuje sosede*, če sta za vsaka dva sosedna vozlišča u in v digrafa D, urejena para $(S_\gamma^-(u), S_\gamma^+(u))$ in $(S_\gamma^-(v), S_\gamma^+(v))$ različna. Indeks razlikovanja sosedov digrafa D je potem najmanjše število barv, ki so potrebne za barvanje lokov, ki razlikuje sosede v digrafu D.

Dokažemo zgornje meje za indeks razlikovanja sosedov različnih razredov digrafov.

Ključne besede: Digraf, barvanje lokov, barvanje lokov, ki razlikuje sosede.

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