Cranston, Daniel W.

Multigraphs with $\Delta \geq 3$ are totally-$(2\Delta - 1)$-choosable. (English) Zbl 1221.05133

Graphs Comb. 25, No. 1, 35-40 (2009).

Summary: The total graph $T(G)$ of a multigraph G has as its vertices the set of edges and vertices of G and has an edge between two vertices if their corresponding elements are either adjacent or incident in G. We show that if G has maximum degree $\Delta(G)$, then $T(G)$ is $(2\Delta(G) - 1)$-choosable. We give a linear-time algorithm that produces such a coloring. The best previous general upper bound for $\Delta(G) > 3$ was $\lfloor \frac{3}{2}\Delta(G) + 2 \rfloor$, by *O. V. Borodin*, *A. V. Kostochka*, and *D. R. Woodall* ["List edge and list total colourings of multigraphs," J. Comb. Theory, Ser. B 71, No.2, 184–204 (1997; Zbl 0876.05032)]. When $\Delta(G) = 4$, our algorithm gives a better upper bound. When $\Delta(G) \in \{3, 5, 6\}$, our algorithm matches the best known bound. However, because our algorithm is significantly simpler, it runs in linear time (unlike the algorithm of [loc. cit.]).

MSC:

05C15 Coloring of graphs and hypergraphs

Keywords:

choosability; list coloring; total coloring; multigraph

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