Jakub Przybyło

AGH University of Science and Technology

COLOURING GRAPHS FROM TRIANGLE-FREE LIST ASSIGNMENTS

We shall discuss an observation that Bernshteyn's proof [2] of the breakthrough result of Molloy [3] that triangle-free graphs are choosable from lists of size $(1 + o(1))\Delta/\log\Delta$ can be adapted to yield a stronger result. In particular one may prove that such list sizes are sufficient to colour any graph of maximum degree Δ provided that vertices sharing a common colour in their lists do not induce a triangle in G, which encompasses all cases covered by Molloy's theorem. This was thus far known to be true for lists of size $(1000 + o(1))\Delta/\log\Delta$, as implies a more general result due to Amini and Reed [1]. In the same vein, it can also proven that lists of length $2(r-2)\Delta\log_2\log_2\Delta/\log_2\Delta$ are sufficient if one replaces the triangle by any K_r with $r \geq 4$, which pushes slightly the multiplicative factor of $200r$ from Bernshteyn's result [2] down to $2(r-2)$. All bounds mentioned are also valid within the more general setting of correspondence colourings.

References

[1] O. Amini, B. Reed, *List Colouring Constants of Triangle Free Graphs*, Electronic Notes in Discrete Mathematics 30, 2008, pp. 135–140.

[2] A. Bernshteyn, *The Johansson-Molloy theorem for DP-coloring*, Random Structures & Algorithms 54, 2019, pp. 653–664.

[3] M. Molloy, *The list chromatic number of graphs with small clique number*, J. Combin. Theory Ser. B 134, 2019, pp. 264–284.

[4] J. Przybyło, *On triangle-free list assignments*, arXiv:2203.02980.