ON THE STAIRCASES OF GYÁRFÁS

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In a 2011 paper, Gyárfás investigated a geometric Ramsey problem on convex, separated, balanced, geometric $K_{n,n}$. This led to appealing extremal problem on square 0-1 matrices. Gyárfás conjectured that any 0-1 matrix of size $n \times n$ has a staircase of size $n - 1$.

We introduce the non-symmetric version of Gyárfás' problem. We give upper bounds and in certain range matching lower bound on the corresponding extremal function. In the square/balanced case we improve the $(4/5 + \epsilon)n$ lower bound of Cai, Gyárfás et al. to $5n/6 - 7/12$. We settle the problem when instead of considering maximum staircases we deal with the sum of the size of the longest 0- and 1-staircases.

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