

How to colour a hypergraph

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An r -uniform hypergraph G , whose edges are r -subsets of the vertex set, is properly coloured if each vertex is painted with some colour such that no edge has all its vertices the same colour. Suppose that for each vertex v we are given a list $L(v)$ of colours such that the colour of v must be chosen from $L(v)$. Is it possible to find a proper colouring of G , and if so, how?

This problem is, of course, the list colouring problem for hypergraphs. Alon found a good lower bound for the smallest list size that guarantees a colouring, and the "container method" gives a similar bound for hypergraphs. We discuss the various merits of one or two simple colouring algorithms that aim to produce a colouring when the lists are a little larger than this bound.

This is a joint work with Arès M eroueh.