

Choosability with Union Separation

Mohit Kumbhat, Kevin Moss*, Derrick Stolee, Iowa State University

List coloring generalizes graph coloring by requiring the color of a vertex to be selected from a list of colors specific to that vertex. One refinement of list coloring, called choosability with separation, requires that the intersection of adjacent lists is sufficiently small. We introduce a new refinement, called choosability with union separation, where we require that the union of adjacent lists is sufficiently large. For $t \geq k$, a (k, t) -list assignment is a list assignment L where $|L(v)| \geq k$ for all vertices v and $|L(u) \cup L(v)| \geq t$ for all edges uv . A graph is (k, t) -choosable if there is a proper coloring for every (k, t) -list assignment. We explore this concept through examples of graphs that are not (k, t) -choosable, demonstrating sparsity conditions that imply a graph is (k, t) -choosable, and proving that all planar graphs are $(3, 11)$ -choosable and $(4, 9)$ -choosable.

Keywords: Choosability, Graph Coloring, List Assignment