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The average size of a connected set in a connected graph with degree constraints

We consider the average density of sets of vertices which are internally connected by edges of a fixed graph. When that graph is a tree, these sets are subtrees, and Jamison established the smallest and largest possible values. If the tree has no degree-2 vertex, both bounds change, and optimal values were given by Vince and Wang.

Much less is known for general graphs, and techniques for trees typically do not generalise. Again, it seems degree-2 vertices are critical. I shall discuss some new bounds, in particular answering a question of Vince, and some open questions.