

Independent Sets of Families of Graphs via Finite State Automata

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Abstract

An *independent set* of a graph is a set of pairwise non-adjacent vertices of the graph. The main goal of this work is the enumeration of the independent sets of a wide set of families of graphs that we call *telescopic families of graphs*, TFGs. What is particularly interesting in our approach is that we obtain our results via finite state automata. Given a TFG, $\{G_n\}_{n \geq 0}$ say, we show how to build its *independence automaton*, that is a deterministic finite automaton that accepts a language in which the number of n -symbol words equals the number of independent sets of G_n , for any $n \geq 0$. Our work has been inspired by the paper [1] that deals, among other things, with the enumeration of the independent sets of grid graphs, i.e. Cartesian products of paths. Needless to say, grid graphs make a TFG.

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References:

- [1] N. J. Calkin and H. S. Wilf, The number of independent sets in a grid graph, *SIAM Journal on Discrete Mathematics* **11-1** (1998) 54–60.