

On Generalized Notions of Dimension

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In many areas of mathematics, there are various notions of dimension, like the dimension of a vector space, or the dimension of an algebraic variety over the complex field, or the dimension of a semialgebraic set over the reals. What can we say about dimension in a general setting when looking at an arbitrary structure? In this talk, I discuss several notions of dimension for abstract structures, including dp-rank, o-minimal dimension, and Morley rank. Tying all of these dimension notions together is the notion of VC-density, which is a measure of the combinatorial complexity of set systems. I define VC-density, discuss how it relates (or conjecturally relates) to the other notions of dimension, and give open problems and partial solutions about computing VC-density in certain classes of structures.