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Comparing subshifts in $\mathbb{Z}$ and $\mathbb{Z}^2$

A subshift is a closed, shift-invariant subset of Cantor space. Also known as symbolic dynamical systems, subshifts were originally used to discretize information from continuous dynamical systems. The simplest kind of subshift is a shift of finite type (SFT), obtained by forbidding finitely many words (or in the two-dimensional case, finitely many $n \times n$ blocks) from occurring anywhere in an element of the subshift. SFTs have been extensively studied in both the one and two-dimensional cases, but the results have divergent characteristics. This difference often stems from the fact that two-dimensional SFTs can embed a Turing machine, while one-dimensional SFTs cannot. The distinction raises the question of whether some more computationally-powerful class of one-dimensional subshifts, such as Π_1^0 subshifts, could provide a better analogy to two-dimensional SFTs. For example, Durand, Romashchenko and Shen (2012), Hochman (2009), and others have described ways to embed one-dimensional Π_1^0 shifts into higher-dimensional SFTs. I will discuss the advantages and limitations of the analogy.