Conley Index Theory, Symbolic Dynamics, and Entropy

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Conley index theory, a generalization of Morse theory, may be used in a computational framework to prove the existence of dynamics of various types. When searching for highly complicated dynamics, however, the Conley index may also become highly complicated and difficult to interpret. We present an automated approach to processing Conley index information for discrete-time dynamical systems. This approach produces a topologically semi-conjugate symbolic system whose entropy serves as a lower bound for the entropy of the system under study. Recent modifications of the original approach produce symbolic systems that capture more of the complexity encoded by the index, in some cases leading to substantial increases in computed lower bounds on system entropy. Sample results will be shown for the 2-dimensional Henon map and the infinite-dimensional Kot-Schaffer map. This is joint work with Rafael Frongillo.