

The Karoubi envelope of the mirage of a subshift

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Abstract

Free profinite semigroups are completions of free semigroups, and for that reason, their elements are frequently called pseudowords. Around 2003, Almeida introduced a fruitful connection between symbolic dynamical systems (also known as subshifts) and free profinite semigroups. Following this research line, we look at the set of pseudowords whose finite factors are blocks of the subshift X . This set is called the mirage of X . The Karoubi envelope of a semigroup received a lot of attention among semigroup theorists since Tilson's paper "Categories as algebra". The mirage of X induces a subcategory of the Karoubi envelope of the free profinite semigroup, denoted $\text{Kar}(X)$. We show that the correspondence $X \rightarrow \text{Kar}(X)$ is functorial and that if X and Y are flow equivalent, then $\text{Kar}(X)$ and $\text{Kar}(Y)$ are equivalent categories. (Flow equivalence is a relation of importance for the classification of symbolic dynamical systems.) As a corollary, we deduce the flow invariance of the profinite group $G(X)$ that Almeida associated to an irreducible subshift X . This is joint work with Benjamin Steinberg.