Abstract

We introduce the $k$-bonacci polyominoes, a new family of polyominoes associated with the binary words avoiding $k$ consecutive 1’s, also called generalized $k$-bonacci words. The polyominoes are very entrancing objects, considered in combinatorics and computer science. The study of polyominoes generates a rich source of combinatorial ideas. In this paper we study some properties of $k$-bonacci polyominoes. Specifically, we determine their recursive structure and, using this structure, we enumerate them according to their area, semiperimeter, and length of the corresponding words. We also introduce the $k$-bonacci graphs, then we obtain the generating functions for the total number of vertices and edges, the distribution of the degrees, and the total number of $k$-bonacci graphs that have a Hamiltonian cycle.