

We consider weighted tiling systems to represent functions from graphs to a commutative semiring such as the Natural semiring or the Tropical semiring. The system labels the nodes of a graph by its states, and checks if the neighbourhood of every node belongs to a set of permissible tiles, and assigns a weight accordingly. The weight of a labeling is the semiring-product of the weights assigned to the nodes, and the weight of the graph is the semiring-sum of the weights of labelings. We show that we can model interesting algorithmic questions using this formalism - like computing the clique number of a graph or computing the permanent of a matrix. The evaluation problem is, given a weighted tiling system and a graph, to compute the weight of the graph. We study the complexity of the evaluation problem and give tight upper and lower bounds for several commutative semirings. Further we provide an efficient evaluation algorithm if the input graph is of bounded tree-width.