Generalized Colorings with Applications to some Problems in Robotics

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Abstract

We study the problem where a robot has to pick up items of different sizes which are stored along a corridor. A natural requirement is that the items have to be collected in decreasing order of their sizes. We deal with various systems according to the location of the Entry/Exit station where the robot unloads the collected items after each trip along the corridor. We show that each of these systems can be modeled as a generalized coloring problem in permutation graphs. More precisely, we will be dealing with the problems called Minimum Split Coloring and Minimum Cocoloring. We discuss related complexity issues. Besides, we observe that some systems cannot be modeled in terms of graphs but only in terms of permutations. Some open questions related to the last-mentioned problems will be discussed.