Consensus List Colorings of Graphs and Physical Mapping of DNA

Fred S. Roberts
Rutgers University
Piscataway, NJ, USA

Abstract

In *graph coloring*, one assigns a color to each vertex of a graph so that neighboring vertices get different colors. We shall talk about a consensus problem relating to graph coloring and discuss the applicability of the ideas to the DNA physical mapping problem. In many applications of graph coloring, one gathers data about the acceptable colors at each vertex. A *list coloring* is a graph coloring so that the color assigned to each vertex belongs to the list of acceptable colors associated with that vertex. We consider the situation where a list coloring cannot be found. If the data contained in the lists associated with each vertex are made available to individuals associated with the vertices, it is possible that the individuals can modify their lists through trades or exchanges until the group of individuals reaches a set of lists for which a list coloring exists. We describe several models under which such a consensus set of lists might be attained. In the physical mapping application, the lists consist of the sets of possible copies of a target DNA molecule from which a given clone was obtained.