A sequence of symbols is nonrepetitive if no two adjacent segments are identical. A famous result of Thue from 1906 asserts that there are arbitrarily long nonrepetitive sequences over 3 symbols. We study the following geometric variant of this problem. Given a set of points in the plane and a set of lines, what is the least number of colors needed to color the points so that every line is nonrepetitive? If the resulting geometric graph is planar, then we prove that there is such coloring using at most 405 colors. The proof uses the theorem of Thue and a result of Alon and Marshall concerning homomorphisms of edge colored planar graphs. We also consider colorings of this type involving other geometric graphs. For instance, a nonrepetitive analog of the famous Hadwiger-Nelson problem is formulated as follows: what is the least number of colors needed to color the plane so that every path of the unit distance graph whose vertices are colinear is nonrepetitive? Using a theorem of Thue we prove that this number is at most 36. We conjecture that the actual number of colors needed in both problems is much closer to 4.

Keywords: nonrepetitive coloring, unit distance graph, geometric graph.
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References
