

Title: Universality of point sets for alternating Hamiltonian paths

Author: Ali Czech

Department: Department of Applied Mathematics

Supervisor: doc. Mgr. Jan Kynčl, Ph.D., Department of Applied Mathematics

Abstract: A set M of n points in general position in the plane is called universal for a bipartite graph G with n vertices if for every red-blue 2-coloring of G that does not create a monochromatic edge, and for every coloring of M with the same numbers of points of each color as in G , there exists a planar drawing of G such that each vertex of G is drawn at a unique point of M of the same color, and the edges are drawn as straight-line segments that do not intersect. In this paper, we show that a set of points of even size less than 16 lying on a circle is universal. We describe a specific coloring of a set of 16 points on a circle, where half are red and half are blue, and in which there is no alternating Hamiltonian path. In this work, we introduce the double-arc configuration, which is similar to the well-known double-chain configuration, where one of the arcs is mirror-inverted. The goal of this work is to prove that a set of n points in the double-arc configuration is not universal for any n .

Keywords: Universal point set, alternating Hamiltonian path, double arc