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MADALGO seminar by Lasse Kosetski Deleuran, Aarhus University

Computing Homotopic Simplification in a Plane

Abstract:

We study a variant of the line-simplification problem where we are given a polygonal path $P= p_1, p_2,..., p_n$ and a set O of m point obstacles in a plane, and the goal is to find the optimal homotopic simplification, that is, a minimum subsequence $Q = q_1, q_2, ..., q_k$ ($q_1 = p_1$ and $q_k = p_n$) of P defining a polygonal path which approximates P within the given error e and is homotopic to P. We present a general method running in time $O(m(m+n) \log(nm))$ for identifying every shortcut p_ip_j that is homotopic to the sub-path $pi,...,p_j$ of P, called a homotopic shortcut.
Under any desired measure, this method can be simply combined with Imai and Iri' framework to obtain the optimal homotopic simplification.

Joint work with Shervin Daneshpajouh, Mohammad Ali Abam, and Mohammad Ghodsi