Smoothing of Robotic Navigation Trajectories, Based on a Tessellation Generated Weighted Skeleton, Based on Wavefront Dilation and Collisions

Abstract

Discretization processes adapted to robotic configuration spaces designed to limit the possible positions and movements of a robot in a continuous environment, have been based mainly on four methods for robotic motion planning: potential fields based, cell decomposition, roadmaps and sampling. However, these methods are not suitable for finding smooth routes through obstacles, and at he same time, avoiding collisions and taking into account the dimensions of the robot. This work proposes a new tessellation method using Bézier curves, which facilitates drawing of smooth curves while respecting restrictions imposed by the environment. The method takes into account the dimensions of the robot and, through a vector description of the configuration space, it constructs a skeleton of the configuration space between obstacles, where each point of the skeleton, in addition to having information on its coordinate, includes information about the transverse distance between objects at each point of the skeleton.

Keywords: Voronoi diagrams; Tessellation; Bezier curves; Navigation