

Abstract

Contour trees are extensively used in scalar field analysis. The contour tree is a data structure that tracks the evolution of level set topology in a scalar field. Scalar fields are typically available as samples at vertices of a mesh and are linearly interpolated within each cell of the mesh. A more suitable way of representing scalar fields, especially when a smoother function needs to be modeled, is via higher order interpolants. We propose an algorithm to compute the contour tree for such functions. The algorithm computes a local structure by connecting critical points using a numerically stable monotone path tracing procedure. Such structures are computed for each cell and are stitched together to obtain the contour tree of the function. The algorithm is scalable to higher degree interpolants whereas previous methods were restricted to quadratic or linear interpolants. The algorithm is intrinsically parallelizable and has potential applications to isosurface extraction.