G^1 SCATTERED DATA INTERPOLATION WITH MINIMIZED SUM OF SQUARES OF PRINCIPAL CURVATURES

Abstract:

One of the main focus of scattered data interpolation is fitting a smooth surface to a set of non-uniformly distributed data points which extends to all positions in a prescribed domain. In this paper, given a set of scattered data V ={(x_i, y_i), i=1,...,n} R^2 over a polygonal domain and a corresponding set of real numbers $\{Z_i\}_{i=1}^n$ we wish to construct a surface S which has continuous varying tangent plane everywhere (G^1) such that S(x $_i y_i$) = z_i. Specifically, the polynomial being considered belong to G^1 quartic Bézier functions over a triangulated domain. In order to construct the surface, we need to construct the triangular mesh spanning over the unorganized set of points, V which will then have to be covered with Bézier patches with coefficients satisfying the G^1 continuity between patches and the minimized sum of squares of principal curvatures. Examples are also presented to show the effectiveness of our proposed method.