Complementary Lidstone interpolation on scattered data sets

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In connection with the problem of the extension of univariate Shepard Bernoulli operators [3] to higher dimensions, we have introduced a new technique for combining classical bivariate Shepard operators with three point polynomial interpolation operators [7]. This technique is based on the association, to each sample point V, of a triangle with a vertex in V and other ones in a neighborhood of V, to minimize the error of the three point polynomial interpolant. The combination inherits both degree of exactness and interpolation conditions, at each node V, of the polynomial interpolant, so that in [4] we succeed to extend Lidstone interpolation to scattered data sets by combining Shepard operators with the three point Lidstone interpolation polynomial [5]. Complementary Lidstone interpolation was recently introduced in [6] and drawn on by Agarwal, Pinelas and Wong in [1, 2]. Complementary Lidstone interpolation naturally complements Lidstone interpolation: in fact, while Lidstone interpolation involves functional evaluations and even order derivatives, Complementary Lidstone interpolation involves functional evaluations and odd order derivatives. In this talk we generalize Complementary Lidstone interpolation to the case of bivariate scattered sample points. Numerical results are provided.

References

[1] R.P. Agarwal, S. Pinelas, P.J.Y. Wong, Complementary Lidstone interpolation and boundary value problems, J. Inequal. Appl., Article ID 624631 (2009), 30 pp.

[2] R.P. Agarwal, P.J.Y. Wong, Piecewise complementary Lidstone interpolation and error inequalities, J. Comput. Appl. Math., 234 (2010), pp. 2543 2561.

[3] R. Caira, F. Dell'Accio, Shepard-Bernoulli operators, Math. Comp. 76 (2007), pp. 299-321.

[4] R. Caira, F. Dell'Accio, F. Di Tommaso, On the bivariate Shepard-Lidstone operators, submitted for publication, (2011).

[5] F.A. Costabile, F. Dell'Accio, Lidstone approximation on the triangle, App. Num. Math. 52 (2005), pp. 339-361.

[6] F.A. Costabile, F. Dell'Accio, R. Luceri, Explicit polynomial expansions of regular real functions by means of even order Bernoulli polynomials and boundary values, J. Comput. Appl. Math. 176 (2005) 77-90.

[7] F. Dell'Accio, F. Di Tommaso, On the extension of the bivariate Shepard-Bernoulli operators to higher dimensions, submitted for publication (2010).