In fact, using $n/3$ as an approximation produces a relative error of $1/(n^2 - 1)$ which is less than 1% for $n > 10$, and for $n = 100$ is approximately 0·01%.

I would suggest that perhaps a test of the pseudo random number generator used by Parsons might disclose some form of bias.

Yours faithfully,

D. S. GRIMSDITCH

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27 May 1976

Mr. Parsons replies:

The routine was written in BASIC as supplied by Southampton University. Since the results were fairly consistent I had no reason to suspect the random number generator at the time, however, subsequent investigations have shown it to be not very good.

Errata

To the Editor
The Computer Journal

Sir

The paper (McLain, 1976) published in your 1976 issue, appears to contain two errors.

The first is that the triangulation algorithm described does not in fact have the property of Pitteway optimality. There exists configurations of data points for which no triangulations are Pitteway optimal, and since the algorithm (which is a good one) produces triangulations for these configurations it cannot have the claimed property.

The second is far more serious. The proposal interpolation methods have continuity only of position and not in general, of any higher derivatives between adjacent triangles. The discontinuities of slope are just visible as valleys on the sides of the large hill in Fig. 5. For continuity it is necessary that the derivatives across each boundary are independent not only of the ordinate at the opposite corner, but also of the position of the opposite corner in the abscissa plane.

Yours faithfully,

M. A. SABIN

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9 September 1976

Reference

MCLAIN, D. H. (1976). Two dimensional interpolation from random data, *The Computer Journal*, Vol. 19, No. 2, pp. 178-181.

Dr. McLain replies:

Mr. Sabin has pointed out an important error in my recent paper (McLain, 1976). The interpolation method described in that paper does not, as was claimed, give a surface with continuous derivatives up to degree $n - 1$. To ensure this a somewhat more complicated weighting function appears to be required. Several such functions are possible, of which the following is perhaps the simplest.

As described in the paper, within a triangle connecting three data points, the interpolating function at an internal point P is a weighted average of the three functions corresponding to the three vertices

$$F = w_1f_1 + w_2f_2 + w_3f_3$$

But the weights w_i should be calculated taking into account not only the perpendicular distances d_i from the point P to the sides of the triangle, but also the distances from the vertices to the feet of these perpendiculars. Let P_1 denote the foot of the perpendicular from P to the side opposite vertex 1, and let d_{21}, d_{31} denote the distances from vertices 2, 3 respectively to P_1. Similarly let d_{12}, d_{13}, d_{23}, d_{32} be defined. Then let

$$v_1 = d_{23}^n d_2^n d_1^n + d_{32}^n d_3^n d_1^n$$
$$v_2 = d_{31}^n d_3^n d_2^n + d_{13}^n d_1^n d_2^n$$
$$v_3 = d_{12}^n d_1^n d_3^n + d_{21}^n d_2^n d_3^n$$

be the unscaled weights, and $w_1 = v_1/(v_1 + v_2 + v_3)$ be these weights scaled so that they add to 1. Then the resulting function F and its derivatives up to those of degree $n - 1$ will be continuous over the plane.

A computer program to implement the above calculation should include a test for the sum $v_1 + v_2 + v_3$ being equal to zero. This can occur only if the point P coincides with one of the vertices. In this event the program should determine which vertex, for example by finding which distance d_i is not zero, and should set $f = f_i$, or equivalently should set $w_i = 1$ and the other weights equal to zero.

The program to calculate the distances d_{21}, etc., can be simple. Thus d_{21} is a linear function

$$d_{21} = ax + by + c$$

of the co-ordinates (x, y) of the point P. Moreover, if l_i and m_i are as described in the paper, then the values of the coefficients a and b should first be set equal to $-m_i$ and l_i respectively. The value of c is $-(ax_2 + by_2)$. Finally, although this step is not necessary if n is even, the sign of $ax_3 + by_3 + c$ should be tested; if this is negative then the signs of a, b and c should be changed. The program can be simpler than the explanation!

Similar corrections are required when extending the method to higher dimensions.

I apologise for this mistake, and hope that it has not caused too much trouble.

Editor's note:

Three further typographical errors in recent papers have been reported.

In the paper by H. J. Curnow and B. A. Wichmann, 'A synthetic benchmark' (Vol. 19, No. 1, pp. 43-49), there was an error on page 48, col. 2, line 30. This should read

$$l := (l - k) \times (k + j);$$

In the paper by D. C. Sutcliffe, 'An algorithm for drawing the curve $f(x, y) = 0$' (Vol. 19, No. 3, pp. 246-249), figures 3(a) and 3(b) were interchanged so that the figure appearing as 3(a) should have been 3(b) and the figure appearing as 3(b) should have been 3(a). These figures represented two algorithms and the interchange could be misleading.

In the paper by Ayse Alaylioglu, G. A. Evans, and J. Hyslop, 'The use of Chebyshev series for the evaluation of oscillatory integrals' (Vol. 19, No. 3, pp. 258-267), the last two exact values in Table 4 should read 0·26746038313517 and 0·00233286903629.

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SIGMOD-77—International Workshop on Management of Data

The International Workshop on Management of Data, sponsored by ACM's SIGMOD, will be held in Toronto on August 3-5, 1977 just prior to IFIP Congress-77. Workshop General Chairman: W. Frank King, IBM Research, San Jose, CA 95193 and Technical Program Chairperson Diane C. Smith, Computer Science Dept., University of Utah, Salt Lake City, Utah 84112. Papers on Data Management should be submitted to Program Chairperson before February 15, 1977.