四次卷积插值及其在数字地图中的应用

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摘要: 四次卷积插值是插值技术中的新方法，这种方法在数字地图、数控加工、图像处理中都是非常有用的，同时在计算机中具有很好的计算性能。四次卷积插值总结了三次样条插值和三次卷积插值法，构造新的插值内核，给出相应的边界条件，使得插值结果保证了三阶近似的精度，连续的二阶导数，而且计算量和存储量低于三次样条插值。本文详述了一维四次卷积插值算法，并推广到二维情况和高阶近似情况中去。数字仿真结果表明将本方法应用到数字地图中具有非常好的性能。

关键词: 四次卷积插值；插值内核；边界条件；数字地图

中图分类号: TP301.6

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QUARTIC CONVOLUTION INTERPOLATION AND ITS APPLICATION IN DIGITAL MAPS

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Abstract: Quartic convolution interpolation（QCI）is a new method in interpolation technology.It Possesses a number of desirable features that make it useful in digital mapping，numerical control and image processing．The method can be Performed efficiently on a digital computer．Taking cubic splines（CS）and cubic convolution interpolation into consideration，with a new interpolation kernel and appropriate boundary conditions，the method achieves third－order precision and continuous second derivative．It requires less computation and storage than that is needed in cubic splines．A one－dimensional interpolation function is presented in this paper．The interpolation functions of two dimension and fourth－order are appiled to this algorithm．The paper concludes with examples of digital maps to illustrate the efficacy of this method，In terms of its performance of computation，precision and reduction in storage.

Key Words: quartic convolution interpolation, interpolation kernel，boundary condition,digital map

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