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理论科学研究

K-th Number Query问题的改进算法研究

陈 鑫

南京大学 计算机科学与技术系，南京 210093

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摘要 K-th number query是计算机算法中的一个基础问题，被广泛作为很多算法实现的重要步骤。对该问题进行了深入研究，并找到了单询问渐近时间复杂度最优的算法。目前一般对于多询问的K-th number query问题使用平衡二叉树解决，询问的时间复杂度为O（lb n）。但该算法实现比较复杂，并且常系数较大，提出了基于Bit Indexed Tree数据结构的算法解决，在同等时间复杂度的前提下，实现简单，隐含的常系数很小。最后进行了实验测试，分析显示该新算法不论在时间上还是空间上都优于现有的算法。

关键词 第K大数查询 位索引树 随机化选择

分类号

Improvement of K-th number query problem algorithm

CHEN Xin

Department of Computer Science and Technology，Nanjing University，Nanjing 210093，China

Abstract

The K-th number query is a fundamental problem in computer algorithm，which is a subroutine of numerous problems.Researchers have done a lot of further work including the linear time algorithm for single K-th number query.The time complexity O（lb n） for each query solution has already been found for the multi-queries K-th number query problem，with the help of balance search tree structure.But the BST-based algorithm is not very easy to implement as well as a big constant factor hidden in the Big-O representation.This paper introduces an algorithm based on Bit Indexed Tree to tackle K-th number query with easy implementation and small constant factor.Finally，the experiment shows that the new algorithm is remarkably faster than previous algorithms with nearly optimal memory usage.

Key words K-th number query bit indexed tree random-select

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通讯作者 陈 鑫