شبكة المعلومات الجامعية

بسم اللّه الرحمن الرحيم

SALWA AKL

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

SALWA AKL

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

SALWA AKL

بعض الوثائق الأصلية تالفة

SALWA AKL

بالرسالة صفحات

لم ترد بالأصل

SALWA AKL

ALEXANDRIA UNIVERSITY
FACULTY OF ENGINEERING

LEAST COST INSERTION AND MERGING AND THEIR APPLICATIONS

A thesis submitted to the
Department of Computer Science and Automatic Control
in partial fulfillment of the requirements
for the degree of
Master of Science

By:
AMR AHMED ELMASRY

Supervised by:
Prof.Dr.: Khalil M. Ahmed
Prof.Dr.: Magdy H. Nagy
Prof.Dr.: Ahmed A. Belal

Alexandria
1994

We certify that we have read this thesis, and that in our opinion it is fully adequate, in scope and quality, as a dissertation for the degree of Master of Science.

Exam. Committee :

1- Prof. Dr. Abdel-Moneim Youssef Belal
Dept. of Electrical Engineering
Cairo University

2- Prof. Dr. Khalil Mohamed Ahmed
Dept. of Computer Science and Automatic Control
Alexandria University

3- Prof. Dr. Ahmed A. Belal
Dept. of Computer Science and Automatic Control
Alexandria University

4- Prof. Dr. Ahmed El Nahas
Dept. of Computer Science and Automatic Control
Alexandria University

For the faculty council :

Prof. Dr. Adel Lotfy Mohamadain

Vice dean for graduate studies and research
Faculty of Engineering,
Alexandria University.

ACKNOWLEDGEMENT

Thank GOD for helping me finish this first step in my long trip for knowledge .

My deepest gratitude and appreciation are due to Prof. Dr. Ahmed A. Belal , for his major part in the preparation of this work, and his previous creative work .
Thanks for his persistent direction and detailed constructive-guidance throughout the work .

I would like to express my deepest gratitude to Prof. Dr. Kalil M. Ahmed and Prof. Dr. Magdy H. Nagy for their help and valuable advices .

Last but not least , I would like to express my deepest thanks to all my department staff for their support and encouragement .

Abstract

Algorithms for achieving the least number of comparisons in insertion and merging are discussed .

First the problem of insertion of an element in a list of elements with different probability values is introduced, known optimal algorithms are presented and compared with old and new heuristic algorithms.

Next the problem of merging (n,2) elements is discussed and a new optimal algorithm reaching the theoretical bound and depending on a geometric presentation of the problem is presented.

Based on this last algorithm the problem of inserting an element in a two_dimensional figure is introduced . New heuristic algorithms are proposed . and their complexities are discussed .

Finally extensions to the (n,3) and (n,m) merging problems, geometrical applications and new multi_dimensional insertion algorithms are introduced .

Table of contents

Chapter 1
Introduction

Introduction

1.1 Introduction [1]

Although abandoned for several years , the problems of insertion, sorting and merging in the least number of comparisons is an area full of unanswered questions. Despite the fact that the theoretical bound is known in all cases , the actual minimum is only known in just very few cases .

For example in the problem of sorting n elements , the theoretical minimum is log(n!) but the actual minimum is only known for values up to n=14 .
For values greater than 14 , it is still not known whether the published values obtained by FORD and JOHNSON in 1959 are indeed the best possible .
Prior to 1959 , the best known results were those obtained ten years earlier in 1949 .

In merging algorithms of n and m elements , the widely used algorithm using n+m-1 comparisons is only optimum when m is close to n .
For most values optimal solutions are not known , except when they coincide with the theoretical minimum.