Algorithms on Trees and Graphs

By Gabriel Valiente

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Graph algorithms is a well-established subject in mathematics and computer science. Beyond classical application fields, such as approximation, combinatorial optimization, graphics, and operations research, graph algorithms have recently attracted increased attention from computational molecular biology and computational chemistry. Centered around the fundamental issue of graph isomorphism, this text goes beyond classical graph problems of shortest paths, spanning trees, flows in networks, and matchings in bipartite graphs. Advanced algorithmic results and techniques of practical relevance are presented in a coherent and consolidated way. This book introduces graph algorithms on an intuitive basis followed by a detailed exposition in a literate programming style, with correctness proofs as well as worst-case analyses. Furthermore, full C++ implementations of all algorithms presented are given using the LEDA library of efficient data structures and algorithms.

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Review

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"The main theme of this (research) monograph on graph algorithms is the isomorphism problem (for trees and graphs). Algorithms are both described on an intuitive basis and presented (and discussed) in detail using Knuth's literate programming style (C++, using the LEDA library). Besides offering an introduction to an interesting and important subject (with applications, e.g., in biology and chemistry), it also is a valuable (and unified) reference to material previously only available in research papers." (P. Schmitt, Monatshefte für Mathematik, Vol. 142 (4), 2004)

"The book goes beyond classical graph problems and addresses algorithmic problems with practical applications. … will have a great potential in the hands of a dedicated teacher who is both willing and capable of using the software. Because much of the material in the book was previously only available in specialized research literature, this book will be very valuable also for researchers of algorithmic graph theory. This richly illustrated book has an extensive bibliography and several appendices describing the software." (Matti Vuorinen, Zentralblatt MATH, Vol. 1007, 2003)

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