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Efficient Graph Representations

Jeremy P. Spinrad



American Mathematical Society

Efficient Graph Representations

Tang Feng



Efficient Graph Representations:

Efficient Graph Representations. Jeremy P. Spinrad, 2003-01-01 [Efficient Graph Representations](#) Jeremy P. Spinrad, 2003-01-01 The book deals with questions which arise from storing a graph in a computer. Different classes of graphs admit different forms of computer representations and focusing on the representations gives a new perspective on a number of problems. For a variety of classes of graphs the book considers such questions as existence of good representations, algorithms for finding representations, questions of characterizations in terms of representation and how the representation affects the complexity of optimization problems. General models of efficient computer representations are also considered. The book is designed to be used both as a text for a graduate course on topics related to graph representation and as a monograph for anyone interested in research in the field of graph representation. The material is of interest both to those focusing purely on graph theory and to those working in the area of graph algorithms.

Basic Graph Theory Md. Saidur Rahman, 2017-05-02 This undergraduate textbook provides an introduction to graph theory which has numerous applications in modeling problems in science and technology and has become a vital component to computer science, computer science and engineering, and mathematics curricula of universities all over the world. The author follows a methodical and easy-to-understand approach. Beginning with the historical background, motivation, and applications of graph theory, the author first explains basic graph theoretic terminologies. From this firm foundation, the author goes on to present paths, cycles, connectivity, trees, matchings, coverings, planar graphs, graph coloring, and digraphs, as well as some special classes of graphs together with some research topics for advanced study. Filled with exercises and illustrations, Basic Graph Theory is a valuable resource for any undergraduate student to understand and gain confidence in graph theory and its applications to scientific research, algorithms, and problem solving.

[Effective and Efficient Representation Learning for Graph Structures](#) Ting Chen, 2019 Graph structures are a powerful abstraction of many real-world data such as human interactions and information networks. Despite the powerful abstraction, graphs are challenging to model due to the high-dimensional, irregular, and heterogeneous characteristics of many real-world graph data. An essential problem arose is how to effectively and efficiently learn the representation for objects in graphs. In this thesis, both the effectiveness as well as efficiency aspects of the graph representation learning problem are addressed. Specifically, we start by proposing an effective approach for learning heterogeneous graph embedding in an unsupervised setting. Then this is generalized to a semi-supervised scenario where label guidance is leveraged. The effective graph representation learning models are followed by efficient techniques where we propose efficient sampling strategies to improve the training efficiency for content-rich graph embedding models. Finally, to reduce storage and memory cost of the embedding table used in various models, we introduce a framework based on KD code which can compress the embedding table in an end-to-end fashion. We conduct extensive experiments on various real-world tasks on graph data, e.g., anomaly detection, recommendation, and text classifications, and the empirical results

validate both effectiveness as well as efficiency of our proposed algorithms

Mastering Discrete Mathematics Gautami Devar,2025-02-20 Mastering Discrete Mathematics is a comprehensive and accessible resource designed to provide readers with a thorough understanding of the fundamental concepts techniques and applications of discrete mathematics Written for students educators researchers and practitioners we offer a detailed overview of discrete mathematics a field that deals with countable distinct objects and structures We cover a wide range of topics including sets logic proof techniques combinatorics graph theory recurrence relations and generating functions Our clear and concise language makes complex mathematical concepts accessible to readers with varying levels of mathematical background Each concept is illustrated with examples and applications to demonstrate its relevance and practical significance in various domains Emphasizing the practical applications of discrete mathematics we explore its use in computer science cryptography optimization network theory and other scientific disciplines Each chapter includes exercises and problems to reinforce learning test understanding and encourage further exploration of the material Additional resources including supplementary materials interactive exercises and solutions to selected problems are available online to complement the book and facilitate self study and review Whether you are a student looking to gain a solid foundation in discrete mathematics an educator seeking to enhance your teaching materials or a practitioner interested in applying discrete mathematics techniques to real world problems Mastering Discrete Mathematics offers valuable insights and resources to support your learning and exploration of this fascinating field

Mathematical Reviews ,2006 *Leveraging Graph Neural Networks for Efficient Word Representations* Ryan Himes,2024 Sentence structure can consist of a complex structure of tokens and relationships between tokens which can be hard to represent with only a sequential representation To capture more information about sentence structure we propose representing a sentence as a graph of tokens and relationships between tokens to learn dynamic word embeddings The graph structure is used as input for a graph neural network GNN to learn syntactic and semantic information about the sentence by learning a next word prediction task to learn the embeddings We also experiment with using the graph structure as input for different natural language classification tasks Results show that using the GNN ARMAConv on natural language classification tasks can increase accuracy over a sequential representation Also using the newly trained dynamic word embeddings achieves a higher validation accuracy compared to all other word embeddings tested on the tweet disaster classification data set

PBHD: an Efficient Graph Representation for Floating Point Circuit Verification Carnegie-Mellon University. Computer Science Dept,Yirng-An Chen,Randal E. Bryant,1997 Abstract BMDs HDDs and K BMDs provide compact representations for functions which map Boolean vectors into integer values but not floating point values In this paper we propose a new data structure called Multiplicative Power Binary Hybrid Diagrams PBHDs to provide a compact representation for functions that map Boolean vectors into integer or floating point values The size of the graph to represent the IEEE floating point encoding is linear with the word size The complexity of floating point multiplication grows linearly

with the word size The complexity of floating point addition grows exponentially with the size of the exponent part but linearly with the size of the mantissa part We applied PBHDs to verify integer multipliers and floating point multipliers before the rounding stage based on a hierarchical verification approach For integer multipliers our results are at least 6 times faster than BMD s Previous attempts at verifying floating point multipliers required manual intervention We verified floating point multipliers before the rounding stage automatically

Graph-theoretic Concepts in Computer Science Manfred Nagl,1990

The aim of this workshop series is to contribute to integration in computer science by applying graph theoretic concepts Commonalities between various fields of specialization in computer science may be detected by applying graph theoretic concepts The workshops are unusual in that they combine theoretical aspects with practice and applications Applications dealt with in this volume include the use of graph theoretic concepts in distributed and parallel computation VLSI CAD software engineering computer graphics data structures and computational geometry MU TOC PP

Graph-theoretic Concepts in Computer Science ,2005 **Feature Based Representations for Mid- and High-level Vision** Tang Feng,2008 *Tools and Algorithms for the Construction and Analysis of Systems* ,2004 **Data Structures, Algorithms, and Performance** Derick Wood,1993 Consistently using a framework of abstract data types this book describes all the important data structures and the algorithms that act upon them The book has two underlying goals to present the techniques necessary to analyze the performance of data structures and algorithms and to describe the methods used to determine the good and bad features of data structures

Automatic Object Recognition ,1994 **Proceedings of the Workshop on Computer Vision--Representation and Control** ,1984 **Journal of Digital Systems** ,1982 *Data Structures, Algorithms, and Object-oriented Programming* Gregory L. Heileman,1996 **Graphs: Or The Graphical Representation of Algebraic Functions** Charles Henry French,1904 **Proceedings** ,1981 Computer-aided Verification ,1998

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