CSBC26
19 A 23 DE JULHO | GRAMADO

SBC

Prêmio de Mérito Científico SBC 2026

Celina Miraglia Herrera de Figueiredo

COPPE
UFRJ

A primeira participação no CSBC – 1996

Anais do XXIII Seminário Integrado de Software e Hardware, SEMISH 1996, Recife, p. 415–420.

Início da colaboração UFRJ–Unicamp que tem dado muitos frutos, até hoje!

On the edge-colouring of split graphs

Celina M. H. de Figueiredo* João Meidanis†
Célia Picinin de Mello†

Abstract. We consider the following question: can split graphs with odd maximum degree be edge-coloured with maximum degree colours? We show that any odd maximum degree split graph can be transformed into a special kind of split graph. For these special split graphs, we were able to solve the question provided that the graph has a quasi-universal vertex.

Sumário. Consideramos o seguinte problema: grafos split com grau máximo ímpar admitem uma coloração de arestas com grau máximo cores? Mostramos que qualquer grafo split com grau máximo ímpar pode ser transformado em um tipo especial de grafo split. Para estes grafos split especiais, resolvemos o problema proposto no caso do grafo admitir um vértice quase-universal.

Jornada de Atualização em Informática – JAI 97

Colaboração com Célia Picinin de Mello e João Meidanis me trouxe temas além da minha tese de doutorado

Início de uma série de parcerias fora da UFRJ, buscando independência do meu orientador Jayme Szwarcfiter

Coloração em Grafos

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Resumo

Este texto é uma introdução à coloração em grafos. Consideramos dois tipos de problemas de coloração em grafos: coloração de vértices e coloração de arestas. Aplicamos a estes problemas técnicas clássicas de coloração tais como: algoritmos gulosos, decomposição e alteração estrutural. Consideramos classes de grafos para as quais tais técnicas resolvem estes problemas de coloração eficientemente.

Coloração de Arestas – Grafo do primeiro turno da Copa

Exemplo: planejamento de torneios

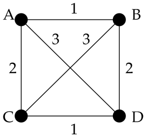
Dada uma federação de times, fazer uma tabela que especifique quem joga com quem em cada rodada

Objetivo: minimizar o número de rodadas

Esquema para grafos completos: fazer a primeira rodada (um emparelhamento máximo qualquer) e depois permutar ciclicamente todos os times, menos o primeiro

Coloração das arestas deste grafo dará um torneio

Vertices = Times
Arestas = Jogos
Cor = Rodada



Times = A, B, C, D

Rodadas	1	2	3
	AB	AC	AD
	CD	BD	BC

Nesta aplicação, cores representam rodadas

Jornada de Atualização em Informática – JAI 99

Jayme Szwarcfiter me transmitiu o interesse em material didático

“Na Universidade se ensina porque se pesquisa.” — Carlos Chagas Filho

Texto contribuiu para o livro “Teoria Computacional de Grafos: Os Algoritmos”, de Jayme Szwarcfiter, publicado em 2018

Emparelhamento em Grafos
Algoritmos e Complexidade

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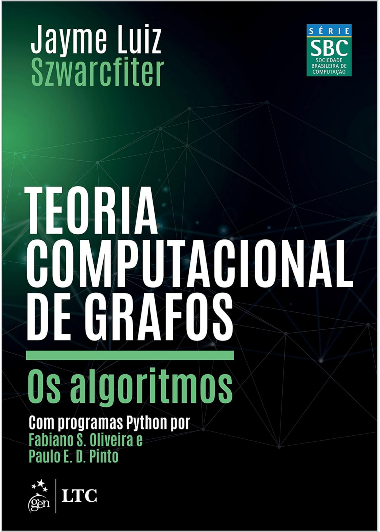
Resumo

Esta monografia considera o problema de emparelhamento em grafos. Encontrar um emparelhamento máximo em um grafo é um problema clássico no estudo de algoritmos, com muitas aplicações: designação de tarefas, determinação de rotas de veículos, problema do carteiro chinês, determinação de percursos mínimos, e muitos outros. O artigo histórico de Edmonds que descreveu um algoritmo $O(n^4)$ para o problema geral de emparelhamento, na verdade, introduziu a noção de algoritmo de tempo polinomial.

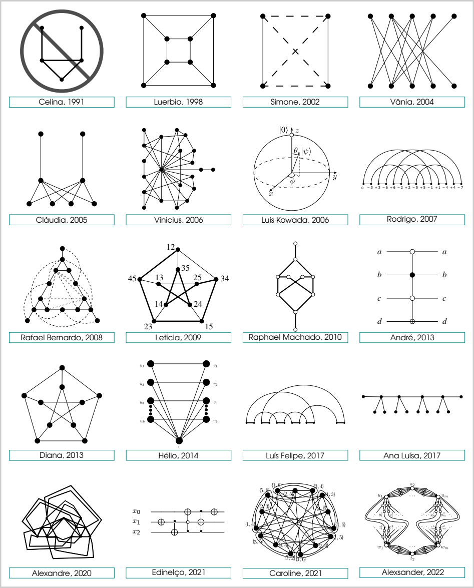
Jayme Szwarcfiter me transmitiu o interesse em material didático

“Na Universidade se ensina porque se pesquisa.” —Carlos Chagas Filho

Texto contribuiu para o livro “Teoria Computacional de Grafos: Os Algoritmos”, de Jayme Szwarcfiter, publicado em 2018



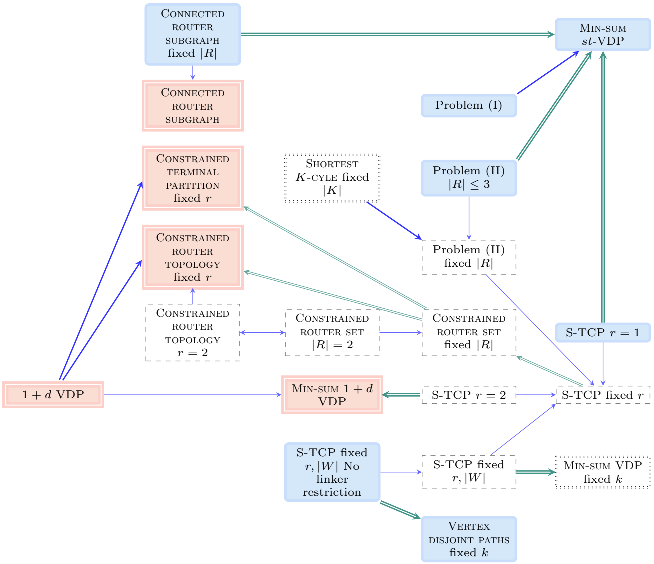
Desde 1999 perseguindo o primeiro lugar do CTD-CSBC



On (In)Tractability Of Connection And Cut Problems – 2022

Alexsander Melo

On (In)Tractability Of Connection And Cut Problems – 2022



Helly Property, Clique Graphs, Complementary Graph Classes, and Sandwich Problems*

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Received 18 January 2008; accepted 12 May 2008

Abstract

A sandwich problem for property Π asks whether there exists a sandwich graph of a given pair of graphs which has the desired property Π. Graph sandwich problems were first defined in the context of Computational Biology as natural generalizations of recognition problems. We contribute to the study of the complexity of graph sandwich problems by considering the Helly property and complementary graph classes. We obtain a graph class defined by a finite family of minimal forbidden subgraphs for which the sandwich problem is NP-complete. A graph is clique-Helly when its family of cliques satisfies the Helly property. A graph is hereditary clique-Helly when all of its induced subgraphs are clique-Helly. The clique graph of a graph is the intersection graph of the family of its cliques. The recognition problem for the class of clique graphs was a long-standing open problem that was recently solved. We show that the sandwich problems for the graph classes: clique, clique-Helly, hereditary clique-Helly, and clique-Helly nonhereditary are all NP-complete. We propose the study of the complexity of sandwich problems for complementary graph classes as a mean to further understand the sandwich problem as a generalization of the recognition problem.

Keywords: Helly property, Clique graphs, Sandwich problems, Computational difficulty of problems.

*An extended abstract was presented at 7th International Colloquium on Graph Theory, Electron. Notes Discrete Math. 22 (2005) 497–500.

1. Introduction

We consider simple, finite, undirected graphs. Given a graph $G = (V, E)$, a *complete set* of G is a subset of V inducing a complete subgraph. A *clique* is a maximal complete set. Let $\mathcal{F}$ be a family of subsets of a set S. We say that $\mathcal{F}$ satisfies the *Helly property* when every subfamily consisting of pairwise intersecting subsets has a non-empty intersection. The Helly property has an important role in Combinatorics and its computational aspects [5]. A graph is *clique-Helly* when its family of cliques satisfies the Helly property. A graph is *hereditary clique-Helly* when all of its induced subgraphs are clique-Helly. This graph class admits a finite family of minimal forbidden subgraphs. A clique-Helly graph that is not hereditary clique-Helly is called *clique-Helly non-hereditary*. The *clique graph of a graph* is the intersection graph of the family of its cliques. G is a *clique graph* if there exists a graph H such that G is the clique graph of H. The recognition problems for the classes of clique-Helly graphs and of hereditary clique-Helly graphs are known to be polynomial. The recognition problem for the class of clique graphs was a long-standing open problem [3, 14, 16, 18] that was recently solved [1]. Clique graphs have been much studied as intersection graphs, and in the context of graph operators, and are included in several books [3, 12, 15].

We consider the following generalization of recognition problems. We say that a graph $G_1 = (V, E_1)$ is a *spanning* subgraph of $G_2 = (V, E_2)$ if $E_1 \subseteq E_2$; and that

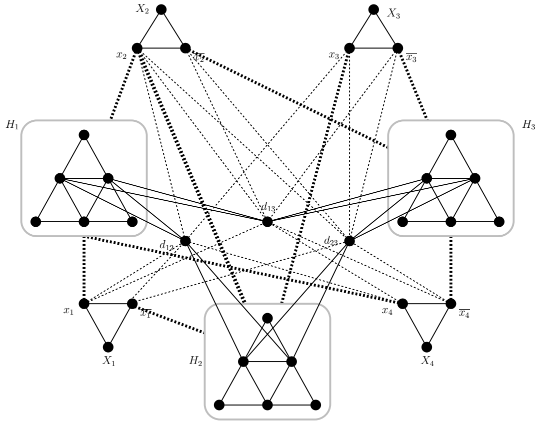

Figure 5. Example of constructed instance of (V, E_1, E_2) corresponding to clauses $\{x_1, x_2, x_4\}$, $\{\overline{x}_1, x_2, x_3\}$, $\{\overline{x}_2, \overline{x}_3, \overline{x}_4\}$

Journal of the Brazilian Computer Society – 2011

J Braz Comput Soc (2011) 17:281–285
DOI 10.1007/s13173-011-0040-8

ORIGINAL PAPER

Complexity separating classes for edge-colouring and total-colouring

Raphael Machado · Celina de Figueiredo

Received: 14 May 2011 / Accepted: 12 September 2011 / Published online: 27 September 2011

Abstract The class of unichord-free graphs was recently investigated in a series of papers (Machado et al. in Theor. Comput. Sci. 411:1221–1234, 2010; Machado, de Figueiredo in Discrete Appl. Math. 159:1851–1864, 2011; Trotignon, Vušković in J. Graph Theory 63:31–67, 2010) and proved to be useful with respect to the study of the complexity of colouring problems. In particular, several surprising complexity dichotomies could be found in subclasses of unichord-free graphs. We discuss such results based on the concept of "separating class" and we describe the class of bipartite unichord-free as a final missing separating class with respect to edge-colouring and total-colouring problems, by proving that total-colouring bipartite unichord-free graphs is NP-complete.

Keywords Theoretical computer science · Computational complexity · Colouring of graphs · Total chromatic number · Bipartite unichord-free

1 Complexity dichotomies and separating classes

Given a class $\mathbb{G}$ of graphs and a graph (decision) problem φ belonging to NP, we say that a *full complexity dichotomy* of $\mathbb{G}$ was obtained if one describes a partition of $\mathbb{G}$ into $\mathbb{G}_1, \mathbb{G}_2, \dots$ such that φ is classified as polynomial or NP-complete when restricted to each $\mathbb{G}_i$. The concept of *full complexity dichotomy* is particularly interesting for the investigation of NP-complete problems: as we partition a class $\mathbb{G}$ into NP-complete subclasses and polynomial subclasses, it becomes clearer why the problem is NP-complete in $\mathbb{G}$. Clearly, if a problem φ is polynomial in $\mathbb{G}$, any partition of $\mathbb{G}$ will determine polynomial subclasses; and if a problem is NP-complete in $\mathbb{G}$, any *finite* partition $\mathbb{G}_1, \mathbb{G}_2, \dots, \mathbb{G}_n$ of $\mathbb{G}$ will determine *at least one* subclass $\mathbb{G}_i$ such that φ restricted to $\mathbb{G}_i$ is NP-complete or the recognition of $\mathbb{G}_i$ is NP-complete.

Another interesting tool for the analysis of problems is the idea of separating class. A class $\mathbb{G}$ of graphs is a *separating class* for problems φ_1 and φ_2 if φ_1 is NP-complete when restricted to $\mathbb{G}$ and φ_2 is polynomial when restricted to $\mathbb{G}$—or vice versa. The nice idea about a separating class is that it shows how the same structure may define a polynomial problem and an NP-complete problem. We recall that the "dual" idea of *separating problem*—a problem that has distinct complexities when restricted to distinct classes—was already investigated in [3]. For instance, vertex-colouring is a separating problem for planar graphs (NP-complete) and its subclass of series-parallel graphs (polynomial) [3]. It is surprising that for most classes proposed in [3] the complexity of edge-colouring remains challenging open.

Recall that an edge-colouring is an association of colours to the edges of a graph in such a way that adjacent edges receive different colours, and a total-colouring is an association of colours to the vertices and edges of a graph in such a way that adjacent or incident elements receive different colours. A graph G is said to be *Class 1* if it admits an edge-colouring using a number of colours equal to its maximum degree $\Delta(G)$; graph G is said to be *Type 1* if it admits a total-colouring using $\Delta(G) + 1$ colours. The study of the complexity of edge-colouring and total-colouring is challenging in the sense that both problems are NP-complete, the restrictions to very few classes are known to be polynomial, and

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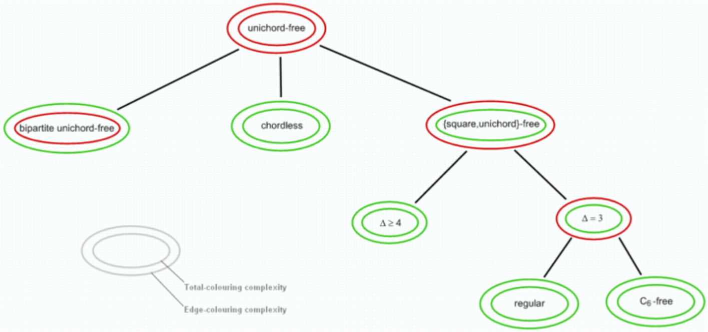
Edge and total coloring complexity-separating classes



When restricted to {square,unichord}-free graphs,
edge coloring is NP-complete whereas total coloring is polynomial

Are you a Mathematician or a Computer Scientist?

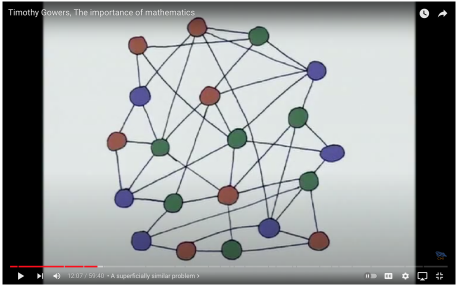
O Problema do Milênio sobre Intratabilidade Computacional

P versus NP – a gift to Mathematics from Computer Science

The question is whether or not, for all problems for which an algorithm can **verify** a given solution quickly (in polynomial time), an algorithm can also **find** that solution quickly

Avi Wigderson expects P not equal NP

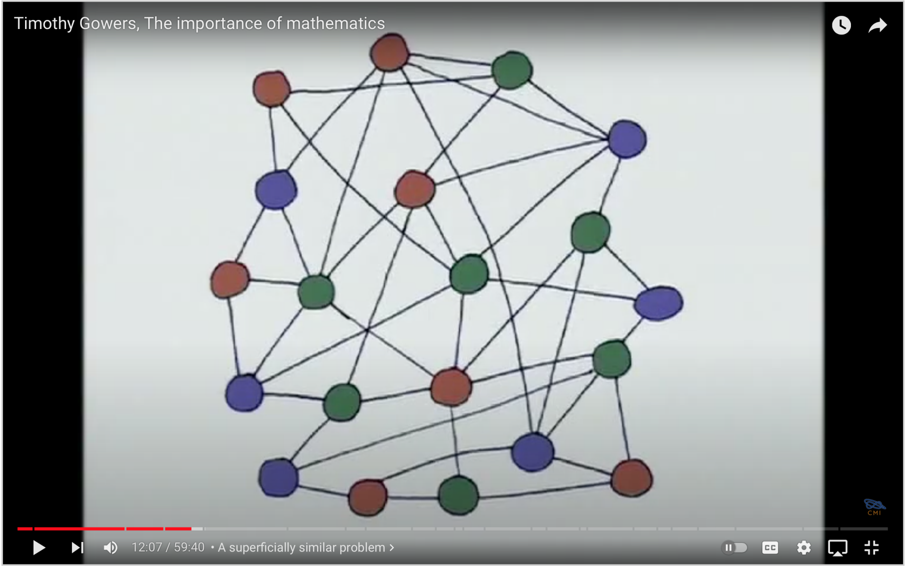
Donald Knuth expects P equal NP



Timothy Gowers, The Importance of Mathematics, 2000

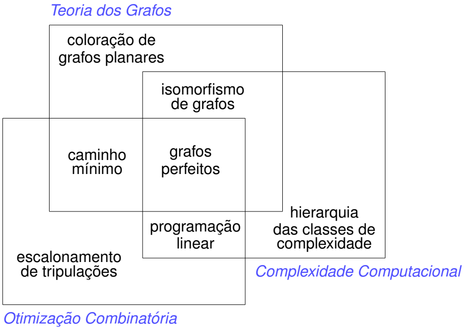
watch Donald Knuth: P=NP

O Problema do Milênio sobre Intratabilidade Computacional



Grafos Perfeitos encontram 3 áreas

Origem e desenvolvimento da área de pesquisa



Algoritmo Não determinístico de tempo Polinomial

Complexidade computacional

A maioria dos problemas computacionais pertence à classe NP,
admitem um certificado polinomial

Em várias e diferentes áreas, procuramos objetos matemáticos:
percurso de um caixeiro viajante, atribuição de verdade, emparelhamento máximo, coloração mínima de um grafo

O objeto matemático procurado é o certificado,
a prova de que o problema está em NP

O estudo da complexidade computacional de problemas considera principalmente problemas em NP e tenta distinguir os solúveis em tempo polinomial dos não através da classe dos problemas NP-completos

C. Papadimitriou – *Computational Complexity* 1994

Dicotomia Polinomial ou NP-completo

Minha contribuição

Que característica de um determinado problema o classifica como polinomial ou NP-completo?

Classificação em P ou NP-completo de dois problemas históricos em teoria dos grafos

Problema cuja complexidade separa classes de grafos
Classe de grafos que separa a complexidade de problemas

Três dicotomias cheias:
todo problema é classificado em P ou NP-completo

"The P vs. NP-complete dichotomy of some challenging problems in graph theory"
Discrete Appl. Math. 2011
(plenária no Latin-American Algorithms, Graphs and Optimization Symposium 2009)

Todo Grafo é Difícil ou Fácil

Dicotomias cheias

Classificar todo membro de uma família de problemas como
Polinomial (fácil) ou NP-completo (difícil)

Quais grafos tornam o problema fácil ou difícil?

Teoremas de dicotomia fornecem bons projetos de pesquisa:
simples de formular, mas trabalhoso para concluir

Requerem domínio de técnicas para desenvolvimento de algoritmos e para provas de dificuldade computacional

Revising Johnson's table for the 21st century

The updated NP-Completeness Column: An Ongoing Guide table 35 years later

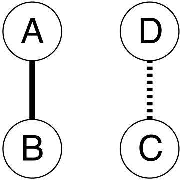
Graph Class	Member		IndSet		Clique		CliPar		ChrNum		ChrInd		HamCir		DomSet		MaxCut		StTree		GraphIso	
Trees/Forests	P	[T]	P	[GJ]	P	[T]	P	[GJ]	P	[T]	P	[GJ]	P	[T]	P	[GJ]	P	[GJ]	P	[T]	P	[GJ]
Almost Trees (k)	P	[OG]	P	[OG]	P	[T]	P	[105]	P	[5]	P	[17]	P	[5]	P	[5]	P	[20]	P	[76]	P	[17]
Partial k-trees	P	[OG]	P	[5]	P	[T]	P	[105]	P	[5]	P	[17]	P	[5]	P	[5]	P	[20]	P	[76]	P	[17]
Bandwidth-k	P	[OG]	P	[OG]	P	[T]	P	[105]	P	[5]	P	[17]	P	[5]	P	[5]	P	[OG]	P	[76]	P	[OG]
Degree-k	P	[T]	N	[GJ]	P	[T]	N	[29]	N	[GJ]	N	[OG]	N	[GJ]	N	[GJ]	N	[GJ]	N	[GJ]	P	[OG]
Planar	P	[GJ]	N	[GJ]	P	[T]	N	[78]	N	[GJ]	O		N	[GJ]	N	[GJ]	P	[GJ]	N	[OG]	P	[GJ]
Series Parallel	P	[OG]	P	[OG]	P	[T]	P	[105]	P	[5]	P	[17]	P	[5]	P	[OG]	P	[GJ]	P	[OG]	P	[GJ]
Outerplanar	P	[OG]	P	[OG]	P	[T]	P	[OG]	P	[OG]	P	[OG]	P	[T]	P	[OG]	P	[GJ]	P	[OG]	P	[GJ]
Halin	P	[OG]	P	[OG]	P	[T]	P	[OG]	P	[5]	P	[17]	P	[T]	P	[OG]	P	[GJ]	P	[118]	P	[GJ]
k-Outerplanar	P	[OG]	P	[OG]	P	[T]	P	[OG]	P	[5]	P	[17]	P	[OG]	P	[OG]	P	[GJ]	P	[76]	P	[GJ]
Grid	P	[OG]	P	[GJ]	P	[T]	P	[GJ]	P	[T]	P	[GJ]	N	[OG]	N	[32]	P	[T]	N	[OG]	P	[GJ]
$K_{3,3}$-Free*	P	[OG]	N	[GJ]	P	[T]	N	[78]	N	[GJ]	O?		N	[GJ]	N	[GJ]	P	[OG]	N	[GJ]	P	[40]
Thickness-k	N	[OG]	N	[GJ]	P	[T]	N	[78]	N	[GJ]	N	[OG]	N	[GJ]	N	[GJ]	N	[119]	N	[GJ]	I	[RJ]
Genus-k	P	[OG]	N	[GJ]	P	[T]	N	[78]	N	[GJ]	O?		N	[GJ]	N	[GJ]	O?		N	[GJ]	P	[OG]
Perfect	P	[34]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	N	[28]	N	[OG]	N	[OG]	N	[20]	N	[GJ]	I	[84]
Chordal	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		N	[93]	N	[OG]	N	[20]	N	[OG]	I	[84]
Split	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		N	[93]	N	[OG]	N	[20]	N	[OG]	I	[108]
Strongly Chordal	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		N	[93]	P	[OG]	N	[109]	P	[OG]	I	[111]
Comparability	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	N	[28]	N	[OG]	N	[94]	N	[102]	N	[GJ]	I	[22]
Bipartite	P	[T]	P	[GJ]	P	[T]	P	[GJ]	P	[T]	P	[GJ]	N	[OG]	N	[94]	P	[T]	N	[GJ]	I	[22]
Permutation	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		P	[44]	P	[OG]	N	[120]	P	[OG]	P	[OG]
Cographs	P	[T]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		P	[OG]	P	[OG]	P	[20]	P	[OG]	P	[OG]
Undirected Path	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		N	[13]	N	[OG]	N	[20]	N	[RJ]	I	[22]
Directed Path	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		N	[99]	P	[OG]	N	[1]	P	[OG]	P	[7]
Interval	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		P	[OG]	P	[OG]	N	[1]	P	[OG]	P	[OG]
Circular Arc	P	[OG]	P	[OG]	P	[OG]	P	[OG]	N	[OG]	O?		P	[106]	P	[OG]	N	[1]	P	[11]	P	[80]
Circle	P	[OG]	P	[GJ]	P	[OG]	N	[73]	N	[OG]	O?		N	[39]	N	[71]	N	[26]	P	[OG]	P	[68]
Proper Circ. Arc	P	[OG]	P	[OG]	P	[OG]	P	[OG]	P	[OG]	O?		P	[OG]	P	[OG]	O?		P	[11]	P	[82]
Edge (or Line)	P	[OG]	P	[GJ]	P	[T]	N	[95]	N	[OG]	N	[28]	N	[OG]	N	[GJ]	P	[59]	N	[19]	I	[OG]
Claw-Free	P	[T]	P	[OG]	N	[103]	N	[85]	N	[OG]	N	[28]	N	[OG]	N	[GJ]	N	[20]	N	[19]	I	[OG]

www.cos.ufrj.br/~celina/ftp/j/RJ-current.pdf

5 estrelas: Finding Skew Partitions Efficiently

Partição assimétrica

SKEW PARTITION
Entrada: Grafo $G = (V, E)$
Pergunta: V admite uma partição em 4 partes não vazias A, B, C, D tal que cada vértice de A é adjacente a cada vértice de B e cada vértice de C não é adjacente a cada vértice de D ?



$A \cup B$ é corte assimétrico

SKEW PARTITION generaliza

- STAR CUTSET
- CLIQUE CUTSET
- HOMOGENEOUS SET

V. Chvátal – *J. Combin. Theory Ser. B* 1985

5 estrelas: Finding Skew Partitions Efficiently

Journal of Algorithms **37,** 505–521 (2000)
doi:10.1006/jagm.1999.1122, available online at http://www.idealibrary.com on IDEAL®

Finding Skew Partitions Efficiently[1]

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5 estrelas: Optimizing Bull-Free Perfect Graphs

Centenary of Celina + Frédéric

September 16-17, 2010, Grenoble, France

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Celina de Figueiredo and Frédéric Maffray met in 1989 in Waterloo, during a workshop on Perfect Graphs organized by Bruce Reed. They have been working together regularly since then. They co-authored several articles, most of them revolving around bull-free graphs.

We will be celebrating the 50th birthdays of Celina and Frédéric in **September 16-17, 2010** in **Grenoble**. For this occasion, we would be happy to gather their former students, professors, colleagues and/or friends for a 2-day meeting in Grenoble, featuring talks on their favourite topics in Graph Theory.

The organizers (**Louis Esperet**, **Myriam Preissmann**, **András Sebő**, and **Zoltán Szigeti**) would like to thank **Marwane Bouznif**, **Julien Darlay**, **Olivier Durand de Gevigney**, **Grégory Morel**, **Ana Silva** and **Valentin Weber** for their help during the meeting.

Sponsors: Programme Pluriformation (PPF) Maths-Info, Laboratoire G-SCOP

5 estrelas: Optimizing Bull-Free Perfect Graphs

SIAM J. Discrete Math.
Vol. 18, No. 2, pp. 226–240

OPTIMIZING BULL-FREE PERFECT GRAPHS*

CELINA M. H. DE FIGUEIREDO† AND FRÉDÉRIC MAFFRAY‡

Abstract. A bull is a graph with five vertices a, b, c, d, e and five edges ab, ac, bc, da, eb. Here we present polynomial-time combinatorial algorithms for the optimal weighted coloring and weighted clique problems in bull-free perfect graphs. The algorithms are based on a structural analysis and decomposition of bull-free perfect graphs.

Key words. graph algorithms, perfect graphs, analysis of algorithms and problem complexity, combinatorial optimization

AMS subject classifications. 05C85, 05C60, 68Q25, 90C27

DOI. 10.1137/S0895480198339237

1. Introduction. A graph G is called *perfect* if the vertices of every induced subgraph G' of G can be colored with $\omega(G')$ colors, where $\omega(G')$ is the maximum clique size in H. Berge [1] introduced perfect graphs and conjectured the following characterization: *A graph is perfect if and only if it contains no odd hole and no odd antihole as an induced subgraph,* where a *hole* is a chordless cycle with at least five vertices, and an *antihole* is the complement of a hole. Graphs with no odd hole and no odd antihole have become known as *Berge* graphs. This conjecture, known as the strong perfect graph conjecture, was proved recently by Chudnovsky et al. [5]; thus *every Berge graph is perfect.* One problem that is not yet solved in this context is the existence of a combinatorial algorithm to compute the chromatic number of a perfect graph. Here we will give such an algorithm for bull-free Berge graphs, i.e., graphs with no induced subgraph isomorphic to a bull, where a *bull* is a graph with five vertices a, b, c, d, e and five edges ab, bc, cd, be, ce (see Figure 1). Our algorithm is based on specific properties of these graphs. Let us recall that Chvátal and Sbihi [3] proved the validity of the strong perfect graph conjecture for bull-free graphs, and subsequently Reed and Sbihi [18] gave a polynomial algorithm for recognizing bull-free Berge graphs.

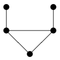
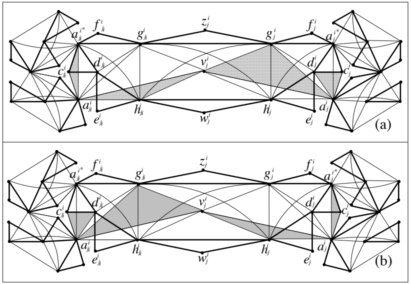


Fig. 1. *The bull.*

5 estrelas: The complexity of clique graph recognition

Clique graph gadget: uma passarela para a variavel u_i



Família-RS de G_I precisa conter ou (a) triângulos falsos ou (b) triângulos verdadeiros. Triângulos em negrito são obrigatórios.

“The complexity of clique graph recognition”
Theoret. Comput. Sci. 2009 (com Liliana Alcon, Luerbio Faria, Marisa Gutierrez)

5 estrelas: The complexity of clique graph recognition

Theoretical Computer Science 410 (2009) 2072–2083

Contents lists available at ScienceDirect

Theoretical Computer Science

journal homepage: www.elsevier.com/locate/tcs

The complexity of clique graph recognition☆

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ARTICLE INFO

Article history:
Received 19 March 2007
Received in revised form 9 December 2008
Accepted 17 January 2009
Communicated by O. Watanabe

Keywords:
Clique graphs
NP-complete problems
Helly property
Intersection graphs

ABSTRACT

A *complete set* of a graph G is a subset of vertices inducing a complete subgraph. A *clique* is a maximal complete set. Denote by $\mathcal{C}(G)$ the *clique family* of G. The *clique graph* of G, denoted by $K(G)$, is the intersection graph of $\mathcal{C}(G)$. Say that G is *a clique graph* if there exists a graph H such that $G = K(H)$. The clique graph recognition problem asks whether a given graph is a clique graph. A sufficient condition was given by Hamelink in 1968, and a characterization was proposed by Roberts and Spencer in 1971. However, the time complexity of the problem of recognizing clique graphs is a long-standing open question. We prove that the clique graph recognition problem is NP-complete.

Dois problemas históricos em teoria dos grafos

Grafos perfeitos: SKEW PARTITION é polinomial

Grafos de interseção: CLIQUE GRAPH é NP-completo

Quando a classificação em P ou NP-completo foi proposta, ambos problemas foram provados em NP

V. Chvátal – *J. Combin. Theory Ser. B* 1985

F. Roberts, J. Spencer – *J. Combin. Theory Ser. B* 1971

5 estrelas: The P versus NP–complete dichotomy of some challenging problems in graph theory

Discrete Applied Mathematics 160 (2012) 2681–2693

Contents lists available at SciVerse ScienceDirect

Discrete Applied Mathematics

journal homepage: www.elsevier.com/locate/dam

The P versus NP–complete dichotomy of some challenging problems in graph theory☆

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ARTICLE INFO

Article history:
Received 9 April 2010
Received in revised form 6 December 2010
Accepted 17 December 2010
Available online 15 January 2011

Keywords:
Analysis of algorithms and problem complexity
Graph algorithms
Structural characterization of types of graphs

ABSTRACT

The Clay Mathematics Institute has selected seven Millennium Problems to motivate research on important classic questions that have resisted solution over the years. Among them is the central problem in theoretical computer science: the P versus NP problem, which aims to classify the possible existence of efficient solutions to combinatorial and optimization problems. The main goal is to determine whether there are questions whose answer can be quickly checked, but which require an impossibly long time to solve by any direct procedure. In this context, it is important to determine precisely what facet of a problem makes it NP-complete. We shall discuss classes of problems for which dichotomy results do exist: every problem in the class is classified into polynomial or NP-complete. We shall discuss our contribution through the classification of some long-standing problems in important areas of graph theory: perfect graphs, intersection graphs, and structural characterization of graph classes. More precisely, we have shown that Chvátal's SKEW PARTITION is polynomial and that Roberts–Spencer's CLIQUE GRAPH is NP-complete. We have also solved the dichotomy for Golumbic–Kaplan–Shamir's SANDWICH problem. We shall describe two examples where we can determine the full dichotomy: the edge-colouring problem for graphs with no cycle with a unique chord and the three nonempty part sandwich problem. Some open problems are discussed: the stubborn problem for list partition, the chromatic index of chordal graphs, and the recognition of split clique graphs.

Coloração: vértices, arestas, total

Classe $\mathcal{C}$ = Grafos sem ciclo com corda única

	VERTEXCOL	EDGECOL	TOTALCOL
grafos de $\mathcal{C}$	P	N	N
grafos de $\mathcal{C}$ sem 4-buraco, $\Delta \geq 4$	P	P	P
grafos de $\mathcal{C}$ sem 4-buraco, $\Delta = 3$	P	N	P

Dicotomia cheia surpreendente para EDGECOL:

$\Delta \geq 4$ é polinomial e $\Delta = 3$ é NP-completo

Classe de grafos separadora surpreendente:

EDGECOL é NP-completo e TOTALCOL é polinomial

"Total chromatic number of {square,unichord}-free graphs"

ISCO 2010, Discrete Appl. Math. 2011 (com Raphael Machado, Nicolas Trotignon)

5 estrelas: Efficient algorithms for clique-colouring and biclique-colouring unichord-free graphs

Algorithmica
DOI 10.1007/s00453-015-0106-7

Efficient Algorithms for Clique-Colouring and Biclique-Colouring Unichord-Free Graphs

H. B. Macêdo Filho[1] · R. C. S. Machado[2] ·
C. M. H. de Figueiredo[1]

Received: 26 March 2014 / Accepted: 22 December 2015

Celina bissexta – 2012

BRASIL

PR4

Pró-Reitoria de Pessoal

Universidade Federal do Rio de Janeiro

Celina Miraglia Herrera de Figueiredo, a primeira professora titular do Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE)

08 de março de 2012

Por: Debora Moreno

SDC/PR4

Há mais de 100 anos, operárias de várias partes do mundo uniram-se em protestos lutando por condições dignas de trabalho e pelo direito do voto. Nos anos 60, o movimento feminista reivindicou igualdade entre homens e mulheres. O Dia Internacional da Mulher não deve ser comemorado apenas como uma data festiva, e sim o resultado de anos de empenho que se traduzem em conquistas cada vez mais frequentes como a de Celina Miraglia Herrera de Figueiredo, a primeira professora titular do Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE).

Como buscar o protagonismo das mulheres em Ciência da Computação?

Bits, Bytes & Batom

Participação Feminina nas Bolsas de Produtividade PQ do CNPq

Veja o que as estatísticas do CNPq mostram sobre as mulheres na Ciência

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Mirella M. Moro, mirella@dcc.ufmg.br, UFMG
Agma J. M. Traina, agma@icmc.usp.br, DCC/ICMC/USP São Carlos

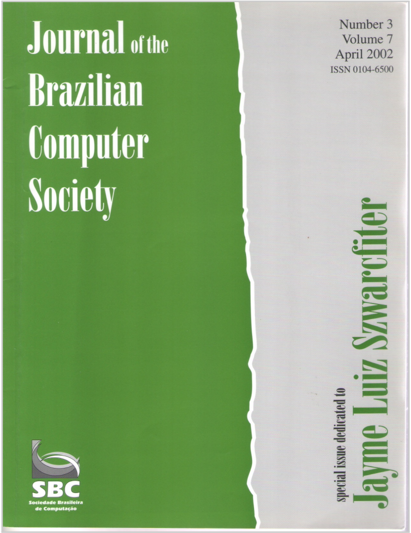
No final de 2011, o número de mulheres com a tão respeitada Bolsa de Produtividade 1A do CNPq triplicou, passando de 1 para 3. Aproveitando essa gloriosa conquista, este artigo apresenta algumas estatísticas sobre a participação feminina nas bolsas de produtividade do CNPq. Não se pretende esgotar o assunto, mas provocar a reflexão sobre os números atuais do CNPq em relação à participação feminina e ao seu reconhecimento na comunidade de pesquisa.

Participação Feminina no Comitê de Assessoramento do CNPq – 2012

Journal of the Brazilian Computer Society – 2002

Figueiredo, C. M. H.; Barbosa, V. C. (Org.) Special issue in honor of Jayme Szwarcfiter. Journal of the Brazilian Computer Society, 2002. v. 7.

Homenagem aos 60 anos de Jayme Szwarcfiter



Journal of the Brazilian Computer Society – 2002

Figueiredo, C. M. H.; Barbosa, V. C. (Org.) Special issue in honor of Jayme Szwarcfiter. Journal of the Brazilian Computer Society, 2002. v. 7.

Homenagem aos 60 anos de Jayme Szwarcfiter

Journal of the Brazilian Computer Society – 2012

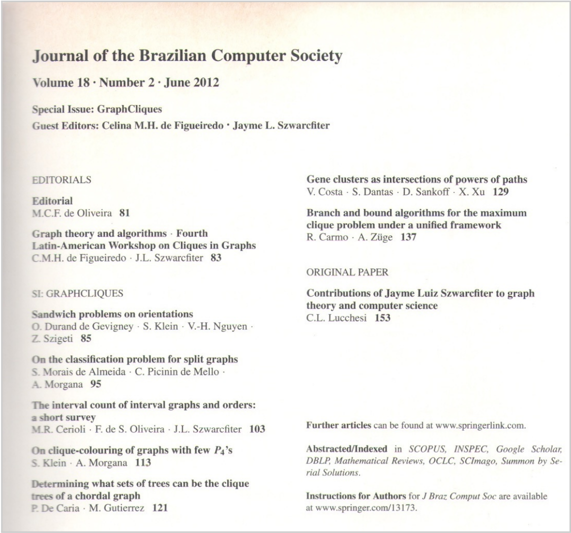
Figueiredo, C. M. H.; Szwarcfiter, J. L. (Org.) Special issue on Graph theory and algorithms. Journal of the Brazilian Computer Society, 2012. v. 18.

Homenagem aos 70 anos de Jayme Szwarcfiter

Journal of the Brazilian Computer Society – 2012

Figueiredo, C. M. H.; Szwarcfiter, J. L. (Org.) Special issue on Graph theory and algorithms. Journal of the Brazilian Computer Society, 2012. v. 18.

Homenagem aos 70 anos de Jayme Szwarcfiter



Journal of the Brazilian Computer Society

Volume 18 · Number 2 · June 2012

Special Issue: GraphCliques

Guest Editors: Celina M.H. de Figueiredo · Jayme L. Szwarcfiter

Further articles can be found at www.springerlink.com.

Abstracted/Indexed in *SCOPUS, INSPEC, Google Scholar, DBLP, Mathematical Reviews, OCLC, SCImago, Summon by Serial Solutions.*

Instructions for Authors for *J Braz Comput Soc* are available at www.springer.com/13173.

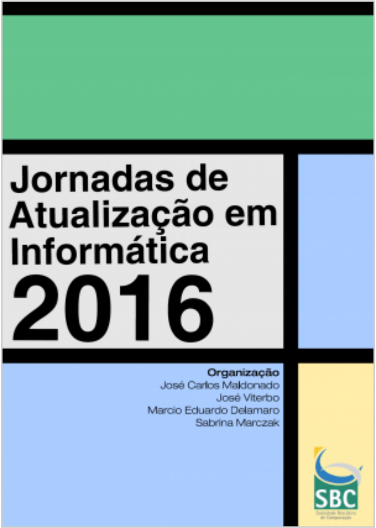
Jornada de Atualização em Informática – JAI 2015

Teoria da Computação: Introdução à Complexidade e à Lógica Computacional

Celina M. H. de Figueiredo, UFRJ

Luís C. Lamb, UFRGS

Jornada de Atualização de Informática, XXXV Congresso da SBC, Recife, Julho de 2015


Jornadas de Atualização em Informática
2016
Organização
José Carlos Maldonado
José Viterbo
Marcio Eduardo Delamaro
Sabrina Marczak
SBC

Intratabilidade e Otimização

Luciana Buriol — Instituto de Informática, UFRGS
Eduardo Uchoa — Departamento de Engenharia de Produção, UFF
Celina Figueiredo — Engenharia de Sistemas e Computação, UFRJ

encontro de teoria da computação
congresso da sbc · porto alegre · 2016

Journal of the Brazilian Computer Society, 2026, 32:1, doi: 10.5753/jbcs.2026.8350

Graphs and Algorithms celebrating a fifty-year landmark

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Received: 27 May 2026 • **Accepted:** 02 June 2026 • **Published:** 16 June 2026

Abstract Landmarks are important and yet hard to celebrate. We have the privilege of witnessing Jayme Luiz Szwarcfiter reach 48 supervised doctoral theses as we celebrate the 50th anniversary of his own doctoral degree. The past five decades have witnessed the birth and growth of a vibrant research community on Graphs and Algorithms in Brazil, covering both the diversity of themes and the diversity of regions of our continental country. Jayme has acted as a key catalyst in articulating collaborations beyond the regions of Brazil to reach Argentina, Mexico, and Chile. He has fostered regional and international collaboration and helped consolidate different research groups in Latin America. On this landmark occasion, we describe some of the noteworthy achievements of our community, with special attention to Professor Szwarcfiter's role.

Keywords: Graph theory, graph algorithms, computational complexity of graph problems, design and analysis of algorithms, combinatorial optimization

1 Honoring Jayme Luiz Szwarcfiter's landmarks

for Scientific and Technological Development (CNPq), and the Brazilian Navy. It recognizes and encourages Brazilian researchers who have made significant contributions to the

CSBC, JAI, JBCS, ETC, LAGOS, LAWCG, meu agradecimento!