

Indifference orders and split-indifference graphs: thirty years of productive collaborative work

Celina Figueiredo¹, Sulamita Klein¹, Mónica Villanueva²

¹COPPE – Universidade Federal do Rio de Janeiro (UFRJ)
Caixa Postal 68511 – 21.941-972 – Rio de Janeiro – RJ – Brazil

²Informatic Engineering Department – Universidad de Santiago de Chile
Santiago, Chile

{celina,sula}@cos.ufrj.br, monica.villanueva@usach.cl

Abstract. *This is an account of our years as students of Jayme Luiz Szwarcfiter, during the years 1990. Two articles perfectly represent our experience as students, young researchers, and young authors [Szwarcfiter et al. 1991, Figueiredo et al. 1993].*

1. Introduction

Jayme Luiz Szwarcfiter has the impressive number of 43 doctoral thesis oriented, being 19 women authors. His contribution in academic training has favored the bonds between Brasil and Latin America. The conference series LAGOS (Latin and American Algorithms, Graphs and Optimization Symposium) and LAWCG (Latin American Workshop on Cliques in Graphs) are some of the results of this collaboration and an opportunity for their descendants to meet.

LAGOS and LAWCG began on 2000. On the early 1990 (prehistory), Jayme's advised students Celina, Oscar, Edson, Célia, Sula, Mónica, Fábio, Márcia, Carmen e Rommel defended their doctoral thesis at Programa de Engenharia de Sistemas e Computação, COPPE-UFRJ.

This work focus on the thesis:

- Celina Figueiredo. Um Estudo de Problemas Combinatórios em Grafos Perfeitos (Combinatorial Problems on Perfect Graphs). 1991;
- Célia Mello. Sobre Grafos Clique-Completo (About Clique-complete Graphs). 1992;
- Sulamita Klein. Algoritmos e Complexidade de Decomposição em Grafos (Algorithms and Complexity of Graphs Decomposition). 1994;
- Mónica Villanueva. Enumeração de Conjuntos Independentes Maximais (Enumerating Maximal Independent Sets). 1996.

Carmen Ortiz thesis untitled “Sobre a Coloração das Arestas de um Grafo” (About Edge Coloring in a Graph), 1994, oriented by Nelson Maculan and Jayme also contributed to our collaboration. The two selected references [Szwarcfiter et al. 1991, Figueiredo et al. 1993] are the first papers written. They allow to follow the thesis theme selection, and even if some thesis have a seemingly independent theme, it is related to the other themes. This related work has facilitated and motivated our collaboration for over 30 years which is still happening.

2. Perfect Graphs and Intersection Graphs

The thesis developed on years 90 had their themes on perfect graphs, the central problems were about their structure. Different known classes of perfect graphs, i.e. chordal, interval and permutation graphs, are defined as the intersection of certain objects. So it is natural to study perfect graphs together with intersection graphs.

The work [Szwarcfiter et al. 1991] about unitary interval graphs presents a proof of their characterization as the vertices order named indifference order. Unitary interval graphs are called indifference graphs.

The paper [Figueiredo et al. 1993] proves that if a graph is split and indifference then it is a comparability graph. So if a graph has a simplicial order and an indifference order and its complement graph admits a simplicial order, then the graph is transitively orientable.

These articles evidence the first results of the research done in the seminars of graduate students supervised by Jayme.

The clique operator considers the maximal cliques intersection graph which is named clique graph of the given graph. Perfect graphs and intersection graphs classes have been studied by the clique operator and the family of maximal independent sets.

3. Conclusion

Thirty years after the beginning of the collaborative research and friendship, the Matemática Contemporânea journal, on its volume for the 9TH LAWCG, meets again the authors and the themes developed by Jayme's students and their descendants. The guest talk about independent sets in corona graphs and several articles related to intersection graphs reflect this fact. We emphasize the relations between Helly property, bicliques intersection graph and paths intersection graph. Edge and total coloring research done by several academic generations has contributed to progress in looking to problem solutions based on structural characterizations of split and interval graphs.

References

- Figueiredo, C., Mello, C., Ortiz, C., and Villanueva, M. (1993). Split-indifference graphs. *Investigación Operativa*, 3:61–67.
- Szwarcfiter, J., Figueiredo, C., Klein, S., and Mello, C. (1991). Ordens indiferença. *Pesquisa Operacional*, 11:43–47.