

Résumé

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September 8, 2016

EDUCATION

- 1987 **Ph.D.** – University of California, Berkeley
Major in Operations Research with minors in Computer Science and Information Systems
- 1979 **M.S.** in Operations Research – Georgia Institute of Technology, Atlanta, GA
- 1978 **Electrical Engineer (Systems)** – Catholic University (PUC), Rio de Janeiro, Brazil

AREAS OF EXPERTISE

Network Science and Graph Theory, Optimization, Heuristics and Metaheuristics, Optimization in Telecommunications, Network Design, Routing, Location, Scheduling, Operations Research Modeling.

TOP CONTRIBUTIONS TO FIELD OF OPERATIONS RESEARCH

GRASP. Proposed the GRASP metaheuristic with T.A. Feo in 1989. Coauthored seminal paper on *greedy randomized adaptive search procedures* with Feo in 1995. Proposed the *evolutionary path-relinking* metaheuristic and its hybridization with GRASP with R.F. Werneck in 2004.

Interior point methods. Proposed the first successful implementation of *Karmarkar's algorithm* in 1989. Coauthored paper with I. Adler, G.G. Veiga, and N.K. Karmarkar showing for the first time that interior point methods could outperform the simplex method in the solution of linear programming problems. Proposed first interior point methods for *network optimization* with G.G. Veiga and showed that these new algorithms outperformed advanced implementations of the network simplex method.

Experimental algorithmics. Proposed the *time-to-target plots* technique for experimental analysis of optimization algorithms, first applying it in 1994 with T.A. Feo and S.H. Smith and then formalizing it in 2002 with R.M. Aiex and C.C. Ribeiro. Coauthored influential paper on designing and reporting computational experiments with R.S. Barr et al. in 1995.

Biased random-key genetic algorithms. Developed the *biased random-key genetic algorithm* metaheuristic with J.F. Gonçalves from 2002. Applied the metaheuristic to create state-of-the-art heuristics for numerous combinatorial optimization problems and coauthored a survey paper with J.F. Gonçalves in 2011 showing the flexibility and effectiveness of this metaheuristic.

Optimization books and handbooks. Coedited with P.M. Pardalos the *Handbook of Applied Optimization* (Oxford U. Press, 2002) and *Handbook of Optimization in Telecommunications* (Springer, 2006). Coauthored the book *Optimization by GRASP – Greedy Randomized Adaptive Search Procedures* with C.C. Ribeiro (Springer, 2016).

JOB HISTORY

- 2014 – now **Principal Research Scientist**, Mathematical Optimization and Planning Group, Amazon.com, Seattle (WA).

- 1988 – 2014 **Lead Research Scientist**, Mathematical Foundations of Computing Department, Algorithms and Optimization Research Department, and Network Evolution Research Department, AT&T Bell Labs, Murray Hill (NJ), AT&T Labs Research, Florham Park (NJ) and Middletown (NJ).
- 1985 – 88 **Consultant**, Schlumberger Palo Alto Research – Fairchild, Palo Alto and AT&T Advanced Decision Support Systems, Whippany (NJ)
- 1985 **Research Staff**, Fairchild Advanced Research & Development Laboratory, Palo Alto
- 1983 – 87 **Research Assistant and Post Graduate Researcher**, Operations Research Center and Electronics Research Laboratory, University of California, Berkeley
- 1979 – 82 **Senior Engineer**, Methods & Models Department, Furnas Power Company, Rio de Janeiro, Brazil

PROFESSIONAL ACTIVITIES

- 1994 – now **Editorial Board Member** of several journals, including J. of Heuristics, J. of Global Optimization, J. of Combinatorial Optimization, Computational Optimization and Applications, Networks, Optimization and Engineering, and International Transactions in Operational Research.
- 2009 – now **Secretary, Treasurer, Vice-Chair, and Chair** of INFORMS Technical Section on Telecommunications.
- 2002 – 07 **Member** of National Science Foundation Operations Research and Optimization Review Panels.
- 2002 – now **Affiliated Faculty** of the Center for Applied Optimization (CAO), University of Florida.
- 1994 – now **Permanent Member** of the Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Rutgers University.
- 1986 – now **Reviewer** for Brazilian National Science and Technology Council, Canadian National Science and Engineering Research Council, Dutch Research Council, Hong Kong Research Grants Council, National Science Foundation, Science Foundation Ireland, Swedish Research Council, Swiss National Science Foundation, as well as numerous peer-reviewed journals.

AWARDS AND HONORS

- 2016 **Fellow**, *Institute for Operations Research and the Management Sciences – INFORMS*, Class of 2016.
- 2012 **IFORS Invited Tutorial Lecturer (IFORS ITL)**, *International Federation of Operational Research Societies*, CLAIO/SBPO 2012 meeting, Rio de Janeiro, Brazil.
- 2010 **Doctor Honoris Causa**, *Universidad Nacional de San Agustín de Arequipa (UNSA)*, Arequipa, Peru.
- 2003 **Outstanding Professional and Scholarly Titles of 2002**, *Handbook of Applied Optimization*, Honorable Mention, Association of American Publishers.
- 1982 – 86 **Ph.D. Fellowship**, Brazilian Science and Technology Council (CNPq)
- 1999 – 06 **Media citations** in *The Economist*, *American Scientist*, and A.-L. Barabási's popular science book *Linked*.

TEN MOST CITED PUBLICATIONS (H-INDEX OF 65 – GOOGLE SCHOLAR)

- 2592 Google Scholar citations: T.A. Feo and M.G.C. Resende, *Greedy randomized adaptive search procedures*, J. of Global Optimization, vol. 6, pp. 109–133, 1995.
- 1057 Google Scholar citations: M.G.C. Resende and C.C. Ribeiro, *Greedy randomized adaptive search*

- procedures*, in “Handbook of Metaheuristics”, F. Glover and G. Kochenberger, eds., Kluwer Academic Publishers, pp. 219–249, 2003.
3. 1005 Google Scholar citations: T.A. Feo and M.G.C. Resende, *A probabilistic heuristic for a computationally difficult set covering problem*, Operations Research Letters, vol. 8, pp. 67–71, 1989.
 4. 570 Google Scholar citations: I. Adler, M.G.C. Resende, G. Veiga, and N.K. Karmarkar, *An implementation of Karmarkar’s algorithm for linear programming*, Mathematical Programming, vol. 44, pp. 297–335, 1989.
 5. 547 Google Scholar citations: P.M. Pardalos and M.G.C. Resende (eds.), *Handbook of Applied Optimization*, Oxford University Press, 2002.
 6. 523 Google Scholar citations: J.F. Gonçalves, J.J.M.Mendes, and M.G.C. Resende, *A hybrid genetic algorithm for job shop scheduling*, European J. of Operational Research, vol. 167, pp. 77–95, 2005.
 7. 514 Google Scholar citations: R.S. Barr, B.L. Golden, J.P. Kelly, M.G.C. Resende, and W.R. Stewart, *Designing and reporting on computational experiments with heuristic methods*, J. of Heuristics, vol. 1, pp. 9–32, 1995.
 8. 435 Google Scholar citations: C.R. Glassey and M.G.C. Resende, *Closed-loop job release control for VLSI circuit manufacturing*, IEEE Transactions on Semiconductor Manufacturing, vol. 1, pp. 36–46, 1988.
 9. 400 Google Scholar citations: P. Festa and M.G.C. Resende, *GRASP: An annotated bibliography*, Essays and Surveys on Metaheuristics, C.C. Ribeiro and P. Hansen, Eds., Kluwer Academic Publishers, pp. 325–367, 2002.
 10. 342 Google Scholar citations: T.A. Feo, M.G.C. Resende, and S.H. Smith, *A greedy randomized adaptive search procedure for maximum independent set*, Operations Research, vol. 42, pp. 860–878, 1994.

TOP THREE BOOKS EDITED (total of 5)

1. *Handbook of Applied Optimization*, **Oxford University Press**, March 2002.
2. *Handbook of Optimization in Telecommunications*, **Springer**, April 2006.
3. *Handbook of Massive Data Sets*, **Kluwer Academic Publishers**, May 2002.

TEN RECENT PUBLICATIONS (total of 226)

1. “*Hybrid method with CS and BRKGA applied to the minimization of tool switches problem*,” (with A.A. Chaves, L.A.N. Lorena, and E.L.F. Senne), **Computers & Operations Research**, vol. 67, pp. 174–183, 2016.
2. “*A biased random-key genetic algorithm for the minimization of open stacks problem*,” (with J.F. Gonçalves and M.D. Costa), **International Transactions in Operational Research**, vol. 23, pp. 25–46, 2016.
3. “*A biased random-key genetic algorithm for wireless backhaul network design*,” (with C.E. Andrade, W. Zhang, R.K. Sinha, K.C. Reichmann, R.D. Doverspike, and F.K. Miyazawa), **Applied Soft Computing**, vol. 33, pp. 150–169, 2015.
4. “*A biased random-key genetic algorithm for the capacitated minimum spanning tree problem*,” (with E. Ruiz, M. Albareda-Sambola, and E. Fernández), **Computers and Operations Research**, vol. 57, pp. 95–108, 2015.
5. “*A biased random-key genetic algorithm for the unequal area facility layout problem*,” (with J.F. Gonçalves), **European J. of Operational Research**, vol. 246, pp. 86–107, 2015.
6. “*Greedy randomized adaptive search procedure with exterior path relinking for differential dispersion minimization*,” (with A. Duarte, J. Sánchez-Oro, M.G.C. Resende, F. Glover, and R. Martí), **Information Systems**, vol. 296, pp. 40–60, 2015.

7. “*Biased random-key genetic algorithms for the winner determination problem in combinatorial auctions*,” (with C.E. de Andrade, R.F. Toso, and F.K. Miyazawa), **Evolutionary Computation**, vol. 23, pp. 279–307, 2015.
8. “*Multiobjective GRASP with path relinking*,” (with R. Martí, V. Campos, and A. Duarte), **European J. of Operational Research**, vol. 240, pp. 54–71, 2015.
9. “*A C++ application programming interface for biased random-key genetic algorithms*,” (with R.F. Toso), **Optimization Methods and Software**, vol. 30, pp. 81–93, 2015.
10. “*An extended Akers graphical method with a biased random-key genetic algorithm for job-shop scheduling*,” (with J.F. Gonçalves), **International Transactions in Operational Research**, vol. 21, pp. 215–246, 2014.

FIVE RECENT PATENTS (total of 15 with another 2 pending)

1. United States Patent 8,730,817 B2, “*Methods and apparatus to determine network link weights*,” with Luciana S. Buriol, Marcus Ritt, and Roger Reis, issued on May 20, 2014.
2. United States Patent 8,693,871, “*System for routing and wavelength assignment in wavelength division multiplexing optical networks*,” with Thiago F. Noronha and Celso C. Ribeiro, issued on April 8, 2014.
3. United States Patent 8,468,043, “*Networks with redundant points of presence using approximation methods and systems*,” with Luciana S. Pessoa and Celso C. Ribeiro, issued on June 18, 2013.
4. United States Patent 8,185,655, “*Maximizing diversity in a subset of elements utilizing GRASP with path relinking*,” with Abraham Duarte, Micael Gallego, and Rafael Martí, issued on May 22, 2012.
5. United States Patent 8,139,502, “*Method and system for network migration scheduling*,” (with Diogo Andrade), issued on March 20, 2012.

FIVE RECENT CONFERENCE PROGRAM COMMITTEE MEMBERSHIPS (total of 87)

1. International Conference on Metaheuristics and Nature Inspired Computing (META’2016), Marrakesh, Morocco, October 27–31, 2016.
2. 2nd Amazon Supply Chain Optimization Summit, Seattle, Washington, USA, October 16–17, 2016.
3. XLVIII Symposium of the Brazilian Operational Research Society (XLVIII SBPO), Vitória, Espírito Santo, Brazil, September 27–30, 2016.
4. Matheuristics 2016 – Sixth International Workshop on Model-based Metaheuristics, Brussels, Belgium, September 4–7, 2016.
5. 15th International Symposium on Experimental Algorithms (SEA 2016), St. Petersburg, Russia, June 5–8, 2016.

FIVE RECENT INVITED PLENARY TALKS

1. “*Biased random-key genetic algorithms: An advanced tutorial*,” Tutorial Talk, with C.C. Ribeiro, **Genetic and Evolutionary Computation Conference (GECCO 2016)**, Denver, CO, U.S.A., July 20–24, 2016.
2. “*Logistics optimization at Amazon: Big data & operational research in action*,” Invited Keynote Talk, **28th European Conference on Operational Research**, Poznań, Poland, July 4, 2016.
3. “*Metaheuristic approaches to continuous global optimization*,” **2nd Brazilian Workshop on Interior Point Methods**, Invited Plenary Talk, Campinas, SP, Brazil, May 17–18, 2016.
4. “*Biased random-key genetic algorithms*,” Invited Plenary Talk, **2nd Brazilian Conference on Industrial Applications of Mathematics (CNMAI 2015)**, Fortaleza, CE, Brazil, October 5, 2015.

5. “*Logistics optimization at Amazon: Big data & operations research in action,*” Invited Plenary Talk, **XLVII Symposium of the Brazilian Operations Research Society (XLVII SBPO)**, Porto de Galinhas, PE, Brazil, August 26, 2015.

PH.D. STUDENT SUPERVISION

8. Fernando Stefanello, Computer Science, Federal U. of Rio Grande do Sul, Porto Alegre, Brazil, graduated 2015.
7. Carlos E. de Andrade, Computer Science, State U. of Campinas, Campinas, Brazil, graduated 2015.
6. Luis Morán Mirabal, Industrial Engineering, Monterrey Tech, Mexico, graduated 2013.
5. Cristian A. Martinez, Computer Science, U. of Buenos Aires, Argentina, graduated 2011.
4. Luciana S. Pessoa, Computer Science, U. Federal Fluminense, Brazil, graduated 2009.
3. Thiago F. Noronha, Computer Science, Catholic U. of Rio de Janeiro, Brazil, graduated 2008.
2. Luciana S. Buriol, Electrical Engineering, State U. of Campinas, Brazil, graduated 2003.
1. Renata M. Aiex, Computer Science, Catholic U. of Rio de Janeiro, Brazil, graduated 2002.

LANGUAGES

Portuguese: Speak, understand, read, write

English: Speak, understand, read, write

Spanish: Speak, understand, read

Italian: Understand, read

French: Read

PERSONAL

Marital Status: Married, two children

Citizenship: Brazil and United States

REFERENCES

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