Carlos Eduardo de Andrade

Curriculum Vitae

AT&T Labs Research
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Professional Interests

Combinatorial Optimization; Mathematical programming; Exact, approximation, and heuristic methods; Operations research; Network design and optimization; Large scale optimization; Machine learning.

General Qualifications

Experience with operations research, mathematical, and algorithmic models for hard and large scale combinatorial optimization problems using integer programming, approximation algorithms, and heuristics. Teaching experience as a professor of computer science for technical and undergraduate students. Experience with software modeling and production using object-oriented languages, mainly C++, Python, R, and Julia.

Education

2010–2015 Ph.D. in Computer Science by Institute of Computing at the University of Campinas – UNICAMP (Brazil).
Thesis tittle: Evolutionary Algorithms for some Problems in Telecommunications
Advisor: Flávio Keidi Miyazawa, D.Sc.
Co-advisor: Mauricio Guilherme Carvalho Resende, Ph.D.
Summa Cum Laude

2004–2006 Master's Degree in Computer Science by Institute of Computing at the University of Campinas – UNICAMP (Brazil).
Dissertation tittle: An exact algorithm in two-dimensional level strip packing.
Advisor: Flávio Keidi Miyazawa. D.Sc.

2000–2004 Bachelor's Degree in Computer Science by University of Lavras – UFLA (Brazil).
Academic project: Optimization Model for Transportation in Reduced Environments.
Summa Cum Laude

On-line platforms and communities

GitHub: https://github.com/ceandrade

ORCID: https://orcid.org/0000-0002-8362-6177

LinkedIn: https://www.linkedin.com/in/carloseduardoandrade

Lattes Curricula Platform: http://lattes.cnpq.br/0384028701061631

Professional Experience

2015–present AT&T Labs Research.
Position: Senior Inventive Scientist.
Advanced Technology & Architecture.
Working on projects related to network design and operations optimization using software-defined Networks instrumented by big data and machine learning.

Feb–Aug, 2015 School of Industrial Systems and Engineering – Georgia Institute of Technology.
Position: Postdoctorate fellow.
Project tittle: High performance computing for mixed-integer programming.
Supervisor: George L. Nemhauser, Ph.D.
Co-supervisor: Shabbir Ahmed, Ph.D. (*in memoriam*)
Funding: Exxon-Mobil Research and Engineering.

2012–2014 AT&T Labs Research, Florham Park / Middletown, NJ, USA.
Position: Researcher / Intern.
Algorithms and Optimization Research Department / Network Evolution Research Department.
Working on projects related to network design and optimization.

2006–2010 Federal Institute for Education, Science and Technology Southern of Minas Gerais - Campus Inconfidentes, MG, Brazil.
Position: Professor.
Teaching Algorithms and Programming, Operating Systems, Structured Programming, and Web Programming in technological courses. Chief-deputy of IT Department. Participating in committee for selection of students, intern issues committees, and others.

2003–2004 SWFactory Consulting and Systems LTDA, Lavras, MG, Brazil.
Position: Software Engineer.
Worked in some projects using J2EE technology.

Referees

Journals:

1. Applied Mathematical Modelling;
2. Applied Soft Computing;
3. Computers & Operations Research;
4. Computer Networks;
5. Heliyon;
6. IEEE Transactions on Evolutionary Computation;
7. International Transactions in Operational Research;
8. Journal of Experimental Algorithms;
9. Journal of Optical Communications and Networking;
10. Materials Today: Proceedings;
11. Networks;
12. Optimization Letters;
13. Optimization Methods and Software;
14. Optimization and Engineering;
15. Production;
16. RAIRO – Recherche Opérationnelle;
17. Revista de Informática Teórica e Aplicada (RITA);
18. Soft Computing;
19. Swarm and Evolutionary Computation.

Conferences:

1. ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)
2. Brazilian Symposium of Operational Research (SBPO);
3. IEEE International Conference on Computer Communications (INFOCOM);
4. IEEE International Conference on Computer Communications and Networks (ICCCN);
5. IEEE Military Communications Conference (MILCOM);
6. International Symposium on Experimental Algorithms (SEA);
7. International Workshop on Hybrid Metaheuristics (HM);
8. Learning and Intelligent Optimization Conference (LION);
9. Multi-conference on Systemics, Cybernetics and Informatics;
10. (Brazilian) National Congress of Mathematics applied to the Industry (CNMAI).

Publications

Full paper in journals

1. **C.E. Andrade**, R.F. Toso, J.F. Gonçalves, M.G.C. Resende. *The Multi-Parent Biased Random-Key Genetic Algorithm with Implicit Path-Relinking and its real-world applications.* European Journal of Operational Research, to appear. DOI: 10.1016/j.ejor.2019.11.037
2. **C.E. Andrade**, S.D. Byers, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T. Volinsky. *Scheduling software updates for connected cars with limited availability.* Applied Soft Computing, volume 82, page 105575, 2019. DOI: 10.1016/j.asoc.2019.105575
3. **C.E. Andrade**, T. Silva, L.S. Pessoa. *Minimizing flowtime in a flowshop scheduling problem with a biased random-key genetic algorithm.* Expert Systems with Applications, volume 128, pages 67–80, 2019. DOI: 10.1016/j.eswa.2019.03.007
4. L. Pessoa, **C.E. Andrade**. *Heuristics for a flowshop scheduling problem with stepwise job objective function.* European Journal of Operational Research, volume 266, issue 3, pages 950–962, 2018. DOI: 10.1016/j.ejor.2017.10.045
5. **C.E. Andrade**, S. Ahmed, G.L. Nemhauser, Y. Shao. *A hybrid primal heuristic for finding feasible solutions to mixed integer programs.* European Journal of Operational Research, volume 263, issue 1, pages 62–71, 2017. DOI: 10.1016/j.ejor.2017.05.003
6. M.C. Lopes, **C.E. Andrade**, T.A. Queiroz, M.G.C. Resende, F.K. Miyazawa. *Heuristics for a Hub Location-Routing Problem.* Networks, volume 68, number 1, pages 54–90, 2016. DOI: 10.1002/net.21685
7. **C.E. Andrade**, M.C.G. Resende, W. Zhang, R.C. Sinha, K.C. Reichmann, R.D. Doverspike, F.K. Miyazawa. *A Biased Random-key Genetic Algorithm for Wireless Backhaul Network Design.* Applied Soft Computing, volume 33, pages 150–169, 2015. DOI: 10.1016/j.asoc.2015.04.016.
8. **C.E. Andrade**, R.F. Toso, M.C.G. Resende, F.K. Miyazawa. *Biased Random-Key Genetic Algorithms for the Winner Determination Problem in Combinatorial Auctions.* Evolutionary Computation, volume 23, number 2, pages 279–307, 2015.
DOI: 10.1162/EVCO_a_00138.

Full papers in conferences

1. **C.E. Andrade**, S.D. Byers, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T. Volinsky. *Connected cars in a cellular network: A measurement study.* Proceedings of the 17th ACM Internet Measurement Conference (IMC 2017), London, 2017. DOI: 10.1145/3131365.3131403

2. **C.E. Andrade**, S.D. Byers, V. Gopalakrishnan, E. Halepovic, M. Majmundar, D.J. Poole, L.K. Tran, C.T. Volinsky. *Managing massive firmware-over-the-air updates for connected cars in cellular networks.* Proceedings of the 2nd ACM International Workshop on Connected and Automated Vehicle Mobility (CarSys 2017, a workshop of MobiCom 2017). Snowbird, USA, 2017. DOI: 10.1145/3131944.3131953

3. **C.E. Andrade**, M.C.G. Resende, W. Zhang, R.C. Sinha, K.C. Reichmann, R.D. Doverspike, F.K. Miyazawa. *A Biased Random-key Genetic Algorithm for Wireless Backhaul Network Design.* 11th Metaheuristics International Conference (MIC 2015), Agadir, Morocco, 2015. (category: high-quality manuscripts that have recently, within the last six months, been submitted or accepted for journal publication).

4. **C.E. Andrade**, M.C.G. Resende, H.J. Karloff, F.K. Miyazawa. *Evolutionary Algorithms for Overlapping Correlation Clustering.* Proceedings of the 16th International Conference on Genetic and Evolutionary Computation (GECCO' 14), pages 405–412, New York, NY, USA, 2014. DOI: 10.1145/2576768.2598284.

5. M.L. Lucena, **C.E. Andrade**, M.C.G. Resende, F.K. Miyazawa. Some extensions of biased random-key genetic algorithms. XLVI Brazilian Symposium of Operational Research (SBPO' 14), pages 2469–2480, Salvador, BA, Brazil, 2014. `http://www.din.uem.br/sbpo/sbpo2014/pdf/arq0357.pdf`.

6. **C.E. Andrade**, F.K. Miyazawa, M.C.G. Resende. *Evolutionary Algorithm for the k-Interconnected Multi-Depot Multi-Traveling Salesmen Problem.* Proceedings of the 15th International Conference on Genetic and Evolutionary Computation (GECCO' 13), pages 463–470, New York, NY, USA, 2013. DOI: 10.1145/2463372.2463434.

7. **C.E. Andrade**, F.K. Miyazawa, E.C. Xavier. *An exact algorithm for two-dimensional level strip packing.* In Annals of XXXVIII Brazilian Symposium of Operational Research (SBPO' 06), pages 1701–1712, Goiania, GO, Brazil, 2006. `http://www.ic.unicamp.br/~andrade/publications/andrade_2006.pdf`.

Book chapters

1. M.C. Lopes, T.A. de Queiroz, **C.E. de Andrade**, F.K. Miyazawa. *Solving a variant of the (hub) location-routing problem.* Z. Zhang, Z. M. Shen, J. Zhang e R. Zhang (editores), LISS 2014. Springer Berlin Heidelberg, pages 395–400, 2015. DOI: 10.1007/978-3-662-43871-8_58.

Abstracts and extended abstracts

1. **C.E. Andrade**, S.D. Byers, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T. Volinsky. *Scheduling software updates for connected cars with limited availability.* INFORMS Annual Meeting, Houston, TX, USA, October, 2017.

2. **C.E. Andrade**. *Large scale scheduling problems on Internet of Things.* INFORMS Annual Meeting, Nashville, TN, USA, November, 2016.

3. **C.E. Andrade**. *Heuristics for the Wireless Backhaul Network Design Problem.* Sixth INFORMS Optimization Society Conference, Princeton, NJ, USA, March, 2016.

4. **C.E. Andrade**, G.L. Nemhauser, S. Ahmed, Y. Shao. *A Learning Framework for Feasibility Pump.* INFORMS Annual Meeting, Philadelphia, PA, USA, November, 2015.

5. M.C. Lopes, T.A. de Queiroz, **C.E. de Andrade**, F.K. Miyazawa. *Solving a variant of the (hub) location-routing problem.* Proceedings of the 4th International Conference on Logistics, Informatics, and Services Sciences (LISS' 2014), Berkeley, CA, USA, July, 2014.

6. M.C.G. Resende, **C.E. Andrade**, F.K. Miyazawa, R.D. Doverspike, K. Reichmann, R.K. Sinha, W. Zhang. *A biased random-key genetic algorithm for a prize-collecting directed Steiner forest network design problem.* 12th INFORMS Telecommunications Conference, Lisbon, Portugal, 2014.

7. **C.E. Andrade**, M.C.G. Resende, H.J. Karloff, F.K. Miyazawa. *Solving the Overlapping Correlation Clustering using an Evolutionary Approach.* INFORMS Annual Meeting, Minneapolis, MN, USA, October, 2013.

8. **C.E. Andrade**, F.K. Miyazawa, M.C.G. Resende, R.F. Toso. *Solving the Winner Determination Problem by Biased Random-Key Genetic Algorithms.* XVI Latin American Operations Research Summer School, Bento Gonçalves, RS, Brazil, February 2012.

9. **C.E. Andrade**, F.K. Miyazawa. *Auctions and Algorithms.* Proceedings of the VI Workshop of Theses, Dissertations and Undergraduate Research Works in Progress of the IC–UNICAMP. Technical Report IC-11-13, 2011.

Full papers submitted to journals

1. V. Cunha, P. Villarinho, **C.E. Andrade**, A. Leiras, L.S. Pessoa. *Heuristic approaches for rescue units assignment and scheduling.* European Journal of Operational Research, first revision.

In preparation

1. S. Savaser, A.A. Cire, **C.E. Andrade**, R. Sinha, A. Mahimkar, W. Zhang. *An exact approach on large schedule change scheduling for 5G networks* (temporary title). Full paper.

2. M. Londe, S. Hamacher, **C.E. Andrade**, L.S. Pessoa. *Assigning Random Sequence Indexes on 5G networks: an optimization approach* (temporary title). Full paper.

3. M. Londe, **C.E. Andrade**, L.S. Pessoa. *An evolutionary approach to the p-next center problem* (temporary title). Full paper.

4. **C.E. Andrade**, F.K. Miyazawa. *A new family of Steiner directed acyclic graph problems* (temporary title). Full paper.

Patents

1. **C.E. Andrade**, W.A. Culpepper, V. Gopalakrishnan, S. Puthenpura, W. Zhang. *Apparatuses and methods for identifying infrastructure through machine learning.* United States Patent and Trademark Office (pending number). Deposit date: 10/15/2019.

2. **C.E. Andrade**, S. Puthenpura, N. Shankaranarayanan, S. Stawiarski, Y. Yang, W. Yuan, W. Zhao. *Model-driven Automated Cell PCI/RSI Allocation Optimization in 5G Wireless Network.* United States Patent and Trademark Office (pending number). Deposit date: 04/08/2019.

3. **C.E. Andrade**, A. Mahimkar, R. Riding, R.K. Sinha, W. Zhang. *A scalable approach to conflict-free change deployment in 5G/LTE/cloud networks.* United States Patent and Trademark Office (pending number). Deposit date: 02/15/2019.

4. **C.E. Andrade**, R.K. Sinha, W. Zhang, S. Puthenputa. *Model-Driven Implementation of Services on a Software-Defined Network.* United States Patent and Trademark Office # 10,469,567. Deposit date: 04/14/2017. Granted in 11/05/2019.

5. S. Byers, **C.E. Andrade**, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Rran, C.T Volinsky. *Facilitating Software Downloads To Internet Of Things Devices Via A Constrained Network.* United States Patent and Trademark Office # 10,362,166. Deposit date: 03/01/2017. Granted in 07/23/2019.

6. S. Byers, **C.E. Andrade**, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Rran, C.T Volinsky. *Facilitation Of Efficient Software Downloads For Vehicles.* United States Patent and Trademark Office # 10,470,189. Deposit date: 06/27/2016. Granted in 11/05/2019.

Grants and Projects

2015 *High performance computing based algorithms for mixed integer programming.*
Postdoctorate fellow at Georgia Institute of Technology.
Grants: ExxonMobil Research and Engineering.

2012–2013 *Algorithms for network design problems.*
Visitor/doctoral-sandwich project at AT&T Labs Research.
Grants: The State of São Paulo Research Foundation - FAPESP.

2010–present *Algorithms for network design problems (old title: Algorithms for Winner Determination Problem in Combinatorial Auctions).*
Grants: The State of São Paulo Research Foundation - FAPESP. CAPES Fellowship (Brazilian Government Agency).

2004–2006 *Two Dimensional Cutting and Packing Problems.*
Master dissertation project.
Grants: The State of São Paulo Research Foundation - FAPESP. CAPES Fellowship (Brazilian Government Agency).

2003–2004 *Study of Non-linear Systems Methods and Application in Design of Forage Base Cutting Device.*
Position: Scientific Initiation Student.
Grants: The State of Minas Gerais Research Foundation - FAPEMIG.

Awards and Honors

2017 Making a Difference Team Award, AT&T.

2016 Capes Thesis Award: Second Best Thesis in Computer Science in Brazil.

2016 Best Thesis in Computer Science from the Institute of Computing, University of Campinas, Brazil.

2013 Runner up of New Jersey Chapter of INFORMS Student Operations Research Contest.

2012 First Place in São Paulo Brazil Hackathon sponsored by Facebook.

2010, 2009, 2008 Honored professor. Institute of Technological Education Sul of Minas Gerais - Campus Inconfidentes, Brazil.

2008 Approval in public competition of exams and titles to assistant professor position, University of Alfenas, Brazil.

2008 Accepted for PhD in computer science to University of Copenhagen, Denmark.

2006 Approval in public competition of exams and titles to position of professor of basic, technical and technological levels, Federal Institute for Education, Science and Technology Southern of Minas Gerais - Campus Inconfidentes, Brazil.

2004 *Summa cum laude* for having received the computer science diploma in first position, with overall score of 88%. University of Lavras, Brazil.

2003 ACM International Collegiate Programming Contest 2003. Our team was among the 30 best Brazilian teams.

Organizing Committees

2016–2018 IEEE International Conference on Computer Communications and Networks (ICCCN). Technical program committee.

2015 INFORMS Annual Meeting, Philadelphia, PA, USA. Session chair.

2009 Week of Training and Qualification in Simulation of Electronic Games. Joint work with A.F. Machado and D.M. Tavares, CEFET-MG.

2007 First Workshop on Python Language of Federal Institute for Education, Science and Technology Southern of Minas Gerais - Campus Inconfidentes.

2004 VI SECICOM - Computer Science Week of University of Lavras. II EMECOMP - Regional Meeting of Computer Science Students.

2003 V SECICOM - Computer Science Week of University of Lavras.

Orientations/Supervisions

Master students

2015–present Mariana Alves Londe. *Optimization algorithms for Parameters Assignment in Large Scale Radio Access Networks.*
GCo-advisor: Luciana S. Pessoa – Pontifical Catholic University of Rio de Janeiro.

Participation in Boards

Master thesis Examinations

R.A. Melo, M.C. Santos, C.C.C. Ribeiro, T.O. Januário, **C.E. Andrade**. Master thesis of Michell F.F.M. Queiroz: *Matheuristics for the minimum weigthed feedback vertex set and b-coloring problems.* Department of Computer Science from the Federal University of Bahia, 2019;

A.D. Souza, R.M.D. Frinhani, **C.E. Andrade**. Master thesis of Maurício X. Zaparoli: *SmartLock: Access Control Through Smart Contracts and Smart Property.* Department of Computer Science and Engineering from the Federal University of Itajubá, 2019.

MBA Monograph Examinations

J.C Andrade, M.T.M Castro, **C.E. Andrade**. Board of Sérgio D. Pádua. *Electronic Sales Opportunity for Public Institutions.* Monograph (Improvement/Specialization in Business Strategic Management and Entrepreneurship) – ASMEC, 2008;

J.C Andrade, M.T.M Castro, **C.E. Andrade**. Board of Andréa A. Silva. *Determining the cost for training of the sales price for a company of accessories for curtains: a research-action.* Specialization in Business Strategic Management and Entrepreneurship – ASMEC, 2008;

J.C Andrade, M.T.M Castro, **C.E. Andrade**. Board of Marco A.P. Lopes. *Business Plan for Obtaining Credit Banking: an optimization approach.* Specialization in Business Strategic Management and Entrepreneurship – ASMEC, 2008.

Selective Process and other boards

2009, 2010 Selective process committee of public competition of exams and titles to assistant professor position, Federal Institute for Education, Science and Technology Southern of Minas Gerais – Campus Inconfidentes;

2007, 2008 Students Selective Process Committee - Federal Institute for Education, Science and Technology Southern of Minas Gerais – Campus Inconfidentes;

2007 Intern Disciplinary Committee - Federal Institute for Education, Science and Technology Southern of Minas Gerais – Campus Inconfidentes.

Academic Activities - Teaching Assistant

From August to December 2011 - Teaching Assistant of Analysis of Algorithms II (360h). Institute of Computer Science, University of Campinas.

From March to July 2005 - Teaching Assistant of Introduction of Computer Programming (360h). Institute of Computer Science, University of Campinas.

From July to December 2002 - Teaching Assistant of Programming Languages II (360h). Department of Computer Science, University of Lavras.

From May to August 2002 - Teaching Assistant of Programming Techniques (360h). Department of Computer Science, University of Lavras.

From March to July 2001 - Volunteer Teaching Assistant of Algorithms and Data Structures II (360h). Department of Computer Science, University of Lavras.

Languages

Portuguese – native.

English – excellent reading, good comprehension and writing.

Also speaks C++, Python, Bash, Latex, and some Julia and R.