Carlos Eduardo de Andrade

Curriculum Vitae

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General Qualifications

Experience with operations research, mathematical, and algorithmic models for large-scale combinatorial optimization problems using heuristics and integer programming, mainly for scheduling and network design problems. Experience with software architecture and production using object-oriented languages, mainly C++, Python, and R, and associated libraries. Supervising experience for master and Ph.D. students in computer science and industrial engineering. Reviewer of several top scientific journals and conferences in operations research field. Teaching experience as a professor of computer science for technical and undergraduate students.

Professional Interests

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

Education

⟨**2015**⟩ Ph.D. in Computer Science by Institute of Computing at the University of Campinas – UNICAMP (Brazil). ***Summa Cum Laude***.
⟨**2006**⟩ Master's Degree in Computer Science by Institute of Computing at the University of Campinas – UNICAMP (Brazil).
⟨**2004**⟩ Bachelor's Degree in Computer Science by the University of Lavras – UFLA (Brazil). ***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
Personal homepage https://ceandrade.github.io

Professional Experience

⟨**2015–present**⟩ **AT&T Labs Research.** *Position: Principal Inventive Scientist.*
Summary: Carlos has worked in diverse large-scale optimization projects such as wireless/backhaul network design, several flavors of scheduling, and network optimization. He architected and implemented frameworks such as the BRKGA-MP-IPR and the ONAP OOF. He has also performed management tasks such as being the head of the hiring committee.

- Carlos has been the core architect and developer of the Zapper tool, which handles the scheduling of changes on extremely heterogeneous network elements. Due to its heterogeneous nature, such changes are scheduled and executed by diverse groups with various constraints. We have defined a family of problems with some commonalities but essentially dynamic on the constraints and objective functions. Although some custom heuristics were initially built, we migrated to a model-driven approach by dynamically assembling the optimization model given high-level descriptions of constraints type and cardinalities. We also use machine learning tools, such as clustering to reduce/decompose the instances' size. We have only used open-source tools such as Python (and libraries such as pandas) as the primary programming language, Minizinc for mixed-integer programming modeling, and COIN-OR CBC and Google OR-Tools as tactical solvers. Zapper leverages the ONAP OOF framework and is built as a microservice. In three years, Zapper has scheduled 7+ million changes, with estimated savings of millions each year. We have published two scientific papers and two patents so far;
- Carlos has developed optimization tools for the PCI/RSI deployment on radio networks. Such problems are essentially graph coloring problems with several constraints, such as modulo assignment, change reduction, etc. We have used mixed-integer programming, constraint programming, and custom heuristics to solve very large instances. Our tool is enclosed a closed-loop automation process (SDN) and delivers optimized assignments for 150+ thousand radios on 4G and 5G networks. We have two scientific papers and three granted patents in this project;
- Carlos was the architect and leading core optimization developer for scheduling firmware-over-the-air (FOTA) updates for a fleet of 8+ million connected cars. This is a highly complex scheduling problem with several and very restrictive constraints, for example, the drive must initiate the download/update, and it happens only with the engine on across several power cycles. Our tool analyzes the vehicles' behaviors building a connectivity and network utilization profile for each car. We then segmented such vehicles and created an optimized download schedule, which the manufacturers suggest to the drivers. In the most common scenario compared with previous strategies, our tool reduces the startup delay (difference between the driver notification and actual acceptance) by 54%, reduces the incomplete download number to 59% (within the campaign window), and reduces busy radio utilization in 7%. This was a cross-organization exercise with data science, radio networks, IoT, and optimization personnel. The core was developed in C++ (heuristics and mixed-integer programming), but we have use R, Bash, Perl, Awk, and others in the pipeline. We also have published three scientific papers and two patents (and two extensions);

- Carlos architected the Optimization Framework (OOF) for the Open Network Automation Platform (ONAP), a Linux Foundation project for orchestration, management, and automation of network and edge computing services for network operators, cloud providers, and enterprises. OOF is composed of a set of microservices intended to be used as a transparent optimization provider. It leverages mixed-integer programming and constraint programming through the Minizinc modeling language. The user can either use one of the models in the OOF library or provide his/her own (in some cases, the user can also provide a custom heuristic code in a sandbox). The optimization is carried out in balanced servers using primary open-source solvers such as COIN-OR CBC and Google OR-Tools and commercial tools such as IBM ILOG CPLEX and Gurobi Optimizer. We have one patent for this framework;
- Carlos has worked on other optimization projects such as ENDC 4G/5G, service and equipment decommissioning, license and entitlement assignments, fixed wireless planning and deployment, retirement of plain old telephone system, and others. He also served as a consultant across organizations in projects such as floor optimization (pre and post-pandemic) and technician dispatching. Scientific papers and patents were submitted/filed.
- Carlos is the main idealizer and developer of the Multi-Parent Biased Random-Key Genetic Algorithm with Implicit Path-Relkinking (BRKGA-MP-IPR) framework. This genetic algorithm has excellent performance, mainly for real-world problems or problems with a lot of structure. Carlos has implemented BRKGA-MP-IPR in C++ (main library), Julia, and Python.

⟨2017–present⟩ Department of Industrial Engineering – Pontifical Catholic University of Rio de Janeiro.
Position: Research Collaborator.

- Carlos has advised master and Ph.D. students on classical combinatorial optimization and algorithm engineering fields. Particularly, we seek to utilize stochastic and machine learning techniques on classical metaheuristics to produce out-of-the-box parameter-free algorithms for production environments;
- Currently, Carlos supervises one master and one Ph.D. student. He has supervised one master student previously.

⟨Feb–Aug, 2015⟩ School of Industrial Systems and Engineering – Georgia Institute of Technology.
Position: Postdoctoral Fellow.

- Carlos worked on methods that help find feasible solutions for mixed-integer problems for which finding such solutions is very hard. The proposed algorithm uses information from several applications of the feasibility pump starting from different fractional (and possible infeasible) solutions to identify variables to fix and reduce the size of the problem and speed up the search. The algorithm consists of three phases: the evolutionary phase using a modified version of the feasible pump heuristic; the local MIP search phase that uses information from the evolutionary phase to fix variables, add cuts, and perform enumeration; and the fixing phase responsible for fixing variables and reducing the size of the problem for the evolutionary phase. The experimental results on a hard class of MIP instances indicate that the proposed approach can find more feasible solutions than the original feasibility pump and the commercial solvers. This project was funded by Exxon-Mobil Research and Engineering, and resulted in a tool and a scientific paper.

⟨2013–2014⟩ AT&T Labs Research. *Position: Position: Intern Researcher / Visiting Student.*

- Carlos developed an optimization tool for small cells and a hybrid microwave/fiber backhaul placement. We first create the demand forecast using private and public information such as demographics (school districts, voting zones, utility infrastructure, and others). With the demand and fixed/variable costs forecast, our tool chooses the best locations to install the small cells and maximize the backhaul capacity so that demand/cost operations differences are maximum as possible. We used C++ (heuristics and mixed-integer programming), Python, Bash, and other tools. We have one scientific paper and one patent on this project;
- Carlos worked with other small optimization projects, such as the winner determination problem in combinatorial auctions, the overlapping correlation clustering problem, and radio antenna tilt optimization. He also proposed the BRKGA-MP and BRKGA-GD optimization frameworks. Except the tilt optimization, all the projects generated, at least, one scientific paper.

⟨2006–2010⟩ Federal Institute for Education, Science, and Technology Southern of Minas Gerais.
Position: Professor.

- Carlos taught Algorithms and Data Structures I and II, Operating Systems, and Web Programming in technological and undergraduate courses.
- He was chief deputy of the IT Department, and he participated in committees for student admissions, internal issues, community reach out, activities, and others.

⟨2003–2004⟩ SWFactory Consulting and Systems. *Position: Full-stack Java Software Engineer.*

⟨2000–2002⟩ Informatics Center of the University of Lavras. *Position: Local Area Metwork Engineer/Manager.*

Revision/Referee Service

Journals

1. Applied Mathematical Modelling;
2. Applied Soft Computing;
3. Computers & Operations Research;
4. Computer Networks;
5. Expert Systems with Applications;
6. Heliyon;
7. IEEE Journal on Selected Areas in Communications;
8. IEEE Transactions on Evolutionary Computation;
9. Information Sciences;
10. International Transactions in Operational Research;
11. Journal of Experimental Algorithms;
12. Journal of Optical Communications and Networking;
13. Materials Today: Proceedings;
14. Networks;
15. Optimization Letters;
16. Optimization Methods and Software;
17. Optimization and Engineering;
18. Physica A: Statistical Mechanics and its Applications
19. Production;
20. RAIRO – Recherche Opérationnelle;
21. Revista de Informática Teórica e Aplicada (RITA);
22. Soft Computing;
23. 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. M.A. Londe, **C.E. Andrade**, L.S. Pessoa. *An evolutionary approach for the p-next center problem.* Expert Systems with Applications, volume 175, 114728, 2021. DOI: 10.1016/j.eswa.2021.114728
2. **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, volume 289, number 1, pages 17–30, 2021. DOI: 10.1016/j.ejor.2019.11.037
3. **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
4. **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
5. 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
6. **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
7. 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
8. **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.
9. **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. A. Mahimkar, **C.E. Andrade**, R.K. Sinha, G. Rana *A Composition Framework for Change Management.* Proceedings of the 2021 ACM SIGCOMM 2021 Conference. Virtual Conference, New York, USA, Aug 24–27, pages 788–806, 2021. DOI: 10.1145/3452296.3472901
2. **C.E. Andrade**, A. Mahimkar, R.K. Sinha, W. Zhang, A. Ciré, G. Rana, Z. Ge, S. Puthenpura, J. Yates, R. Riding *Minimizing Effort and Risk with Network Change Deployment Planning.* Proceedings of the 20$^{\text{th}}$ International IFIP Networking Conference. Espoo, Finland, June 21–24, 2021. DOI: 10.23919/IFIPNetworking52078.2021.9472779

3. M.A. Londe, **C.E. Andrade**, L.S. Pessoa. *Modelos exatos para alocação do Root Sequence Index.* LII Brazilian Symposium of Operational Research (SBPO' 20), João Pessoa, PB, Brazil, November 2020.
4. **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
5. **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
6. **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
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.* 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).
8. **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.
9. 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`.
10. **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.
11. **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. M.A. Londe, P.H.D. Hokama, **C.E. Andrade**, L.S. Pessoa. *Exact And Heuristic Methods For The RSI Allocation Problem.* INFORMS Annual Meeting (Virtual), November, 2020.
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.* INFORMS Annual Meeting, Houston, TX, USA, October, 2017.
3. **C.E. Andrade**. *Large scale scheduling problems on Internet of Things.* INFORMS Annual Meeting, Nashville, TN, USA, November, 2016.
4. **C.E. Andrade**. *Heuristics for the Wireless Backhaul Network Design Problem.* Sixth INFORMS Optimization Society Conference, Princeton, NJ, USA, March, 2016.
5. **C.E. Andrade**, G.L. Nemhauser, S. Ahmed, Y. Shao. *A Learning Framework for Feasibility Pump.* INFORMS Annual Meeting, Philadelphia, PA, USA, November, 2015.
6. 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.
7. 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.
8. **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.
9. **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.
10. **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. Abu-Marrul, A. Leiras, **C.E. Andrade**, L.S. Pessoa. *A reactive biased-randomized iterated greedy search for the rescue units assignment and scheduling problem.* International Transactions in Operational Research.

In preparation

1. M. Londe, **C.E. Andrade**, L.S. Pessoa. *Exact and heuristic approaches for the root sequence index allocation problem* (temporary title). Full paper.
2. **C.E. Andrade**, L.S. Pessoa, S. Stawiarski. *The Physical Cell Identity Assignment Problem: an Multi-objective Optimization Approach* (temporary title). Full paper.

Patents

Granted

1. L.K. Tran, S. Byers, **C.E. Andrade**, E. Halepovic, D.J. Poole, C.T Volinsky. *Facilitation Of Efficient Software Downloads For Vehicles (continuation).* The United States Patent and Trademark Office # 11,026,236. Deposit date: 09/26/2019. Publication date: 01/16/2020. Granted on 06/01/2021.
2. S. Byers, **C.E. Andrade**, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T Volinsky. *Facilitating Software Downloads To Internet Of Things Devices Via A Constrained Network (continuation).* The United States Patent and Trademark Office # 10,958,782. Deposit date: 03/01/2017. Granted on 03/23/2021.
3. A. Mahimkar, R.K. Sinha, **C.E. Andrade**, W. Zhang, R. Riding. *Conflict-free Change Deployment.* United States Patent and Trademark Office # 10,958,517. Deposit date: 02/15/2019. Granted on 03/23/2021.
4. W. Yuan, Y. Yang, **C.E. Andrade**, N. Shankaranarayanan, S. Puthenpura, W. Zhao, S. Stawiarski. *Facilitating Model-Driven Automated Cell Allocation In Fifth Generation (5G) Or Other Advanced Networks.* United States Patent and Trademark Office # 10,834,608. Deposit date: 04/08/2019. Granted on 11/10/2020.
5. **C.E. Andrade**, R.K. Sinha, W. Zhang, S. Puthenputa. *Model-Driven Implementation of Services on a Software-Defined Network (divisional).* The United States Patent and Trademark Office # 10,826,976. Deposit date: 04/14/2017. Granted on 11/03/2020.
6. **C.E. Andrade**, R.K. Sinha, W. Zhang, S. Puthenputa. *Model-Driven Implementation of Services on a Software-Defined Network.* The United States Patent and Trademark Office # 10,469,567. Deposit date: 04/14/2017. Granted on 11/05/2019.
7. S. Byers, **C.E. Andrade**, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T Volinsky. *Facilitating Software Downloads To Internet Of Things Devices Via A Constrained Network.* The United States Patent and Trademark Office # 10,362,166. Deposit date: 03/01/2017. Granted on 07/23/2019.
8. S. Byers, **C.E. Andrade**, V. Gopalakrishnan, E. Halepovic, D.J. Poole, L.K. Tran, C.T Volinsky. *Facilitation Of Efficient Software Downloads For Vehicles.* The United States Patent and Trademark Office # 10,470,189. Deposit date: 06/27/2016. Granted on 11/05/2019.

Pending

1. K.-T. Chen, L. Clayton, **C.E. Andrade**, G. Figueroa, Q. Luo, P. Ramachandran, G. Rotkop, R. Sinha, S. Wolyn *Change Management Deconfliction Algorithm for Multi-layer Virtual Networks.* The United States Patent and Trademark Office , filled. (pending number). Deposit date: 05/17/2021.
2. A. Mahimkar, **C.E. Andrade**, R. Sinha. *Zero Effort, Zero Risk Change Deployment.* The United States Patent and Trademark Office , submitted.
3. A. Mahimkar, **C.E. Andrade**, R. Sinha. *Predicting Service Risk with Correlated Network Changes.* The United States Patent and Trademark Office , submitted.
4. **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.

Awards and Honors

⟨**2021**⟩ Successful graduates in Computer Science from the University of Campinas, CAPES 2017–2020.
⟨**2021**⟩ Making a Difference Team Award, AT&T.
⟨**2020**⟩ Making a Difference Team Award, AT&T.
⟨**2018**⟩ You Deserve Award, AT&T.
⟨**2017**⟩ Making a Difference Team Award, AT&T (twice).
⟨**2016**⟩ Capes Thesis Award: Second Best Thesis in Computer Science in Brazil.
⟨**2016**⟩ Best Thesis in Computer Science from the Institute of Computing, the 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. Federal Institute for Education, Science and Technology Southern of Minas Gerais, Brazil.
⟨**2008**⟩ Approval in public competition of exams and titles to assistant professor position, University of Alfenas, Brazil.
⟨**2006**⟩ Approval in public competition of exams and titles to position of professor. Federal Institute for Education, Science and Technology Southern of Minas Gerais, 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.
⟨**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

Ph.D. students

⟨**2021–present**⟩ Mariana A. Londe. *Hybrid Metaheuristics for Stochastic Optimization*
Co-advisor: Luciana S. Pessoa – Pontifical Catholic University of Rio de Janeiro.

Master students

⟨**2021–present**⟩ Luisa Zambelli *Auto-tuning for Evolutionary Metaheuristics.*
Co-advisor: Luciana S. Pessoa – Pontifical Catholic University of Rio de Janeiro.
⟨**2019–2021**⟩ Mariana A. Londe. *Optimization algorithms for Parameters Assignment in Large Scale Radio Access Networks.*
Co-advisor: Luciana S. Pessoa – Pontifical Catholic University of Rio de Janeiro.

Participation in Boards

Ph.D. thesis Examinations

P.B. Correia, A.F.R. Araújo, E.E. Rego, R.S. Barros, F.C. Munhoz, **C.E. Andrade**. Ph.D. thesis of Fernanda N. Kazama: *Combinatoril Auctions for Energy and Transmission Lines: Solving using Evolutionary Algorithms*. Department of Mechanical Engineering, University of Campinas, 2021.

Master thesis Examinations

L.S. Pessoa, A.C. Santos, D.J. Aloise, **C.E. Andrade**. Master thesis of Thiago A. Virgílio: *Application of the metaheuristic BRKGA to a bi-objective facility location problem.* Department of Industrial Engineering, Pontifical Catholic University of Rio de Janeiro, 2021.

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.

Carlos has participated of several other minor committees including graduation final projects, admission boards, intern disciplinary boards, and others.

Technical Skills

Programming and markup languages: C++ (including STL and templates); Python; Bash Script; R; basic Julia; Latex; Markdown; HTML and Java if needed. Some older techs such as Pascal and PHP.

Data wrangling: Tidyverse libraries (R); Pandas (Python); Unix tool belt: grep, sed, bash, and others.

Optimization software: IBM ILOG CPLEX (C++ API and OPL); Gurobi Optimizer; COIN-OR CBC; Minizinc; irace.

Software Engineering: Object-oriented and test-driven development; Git (software control system); Microservices: REST API (using JSON), and basic Docker; SQL databases; basic CD/CI.

Operating systems: GNU/Linux and Mac OS X; Windows when needed.

Vim: because I prefer to type instead holding keys.

Languages

Portuguese – native.
English – fluent.
Spanish – flirt only.