CURRICULUM VITÆ

Alberto Costa

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Education

09/2012 **Ph.D. in Operations Research (très honorable[1])**, École Polytechnique, Palaiseau, France. [**Supervisors:** P. Hansen, L. Liberti, and I. Tseveendorj].

07/2009 **M.Eng. in Computer Engineering (110/110 cum laude[2])**, Università degli Studi di Padova, Italy. [**Supervisor:** M. Melucci].

09/2007 **B.Eng. in Computer Engineering (110/110 cum laude)**, Università degli Studi di Padova, Italy. [**Supervisor:** M. Moro].

Employment History

10/2017 - present **Project Coordinator**, Future Cities Laboratory (ETH Zurich)
Managing of the Cyber Civil Infrastructure team. [**Advisor:** I.F.C. Smith].

05/2015 - 09/2017 **Researcher**, Future Resilient Systems (NUS Singapore),
Singapore. **Topic:** robust optimization. [**Supervisors:** M. Sim and T.S. Ng].

01/2013 - 01/2015 **Researcher**, Singapore University of Technology & Design (SUTD),
Singapore. **Topic:** black-box optimization. [**Supervisor:** G. Nannicini].

Research Interests and Collaborations

- **Robust optimization**, with M. Sim (Department of Decision Sciences, NUS Business School) and T.S. Ng (Department of Industrial and Systems Engineering, NUS).

- **Black-box optimization**, with G. Nannicini (IBM T.J. Watson Research Centre, NY - USA).

- **Optimization in structural engineering**, with M. Proverbio (Future Cities Laboratory, Singapore) and I.F.C. Smith (École Polytechnique Fédérale de Lausanne, Switzerland).

- **Clustering in complex networks**, with P. Hansen (HEC and GERAD, Montréal - Canada), S. Cafieri (ENAC, Toulouse - France), and M. Ruiz (Artelys, Paris - France).

- **Optimization in information retrieval**, with M. Melucci and E. Di Buccio (Department of Information Engineering, Università degli studi di Padova - Italy), F. Roda (École Polytechnique, France).

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[1]Highest mark awarded by École Polytechnique.
[2]With honors - highest possible grade in the Italian system.

Computer Skills

- **Programming languages:** Linux BASH (basic); Python, MATLAB, R (good).

- **Operating systems:** Linux, Mac OS, Windows.

- **Applications:** AMPL/Pyomo (modeling tools for optimization) with various mixed-integer linear and nonlinear optimization solvers (e.g., Bonmin, Couenne, CPLEX, SCIP), LaTeX.

- **Certifications:** online courses e.g., machine learning, data analysis, statistical inference.

Professional Qualifications

02/2014   **French National University Council (CNU) qualification for Maître de Conférences (assistant professor)** - section 26 (applied mathematics), section 27 (computer science).

12/2009   **Italian State Habilitation for Engineers.**

Awards

04/2013   **Prize "Premio Banca del Centroveneto - Oggi... lo studio per domani"**, awarded by a local bank for Ph.D.

09/2010   **"Concours de mathématiques pour résoudre une énigme au jeu de pile ou face"** (mathematical contest about a problem in the game heads or tails) organized by Pixis RCS Paris A 434 463 055, Xavier Grandsart.
Co-winner with Pierre Deligne (Princeton, *Fields Medal*) and
Maher Younan (University of Geneva).

04/2010   **Prize "Premio Banca del Centroveneto - Oggi... lo studio per domani"**, awarded by a local bank for M.Eng.

04/2002   **Prize "Premio Europa crocevia di culture e speranze"**, awarded by Lions Club for the best article in a workshop about Europe.

List of Publications

INTERNATIONAL JOURNALS (REFEREED)

[1] **A. Costa** and G. Nannicini, *RBFOpt: an open-source library for black-box optimization with costly function evaluations*, Mathematical Programming Computation, Springer, accepted.

[2] M. Proverbio, **A. Costa**, and I.F.C. Smith, *Sensor data interpretation with clustering for interactive asset-management of urban systems*, Journal of Computing in Civil Engineering **32**(6):04018050. ASCE, 2018.

[3] **A. Costa**, D. Georgiadis, T.S. Ng, and M. Sim, *An Optimization Model for Power Grid Fortification to Maximize Attack Immunity*, International Journal of Electrical Power & Energy Systems **99**:594-602. Elsevier, 2018.

[4] M. Proverbio, **A. Costa**, and I.F.C. Smith, *Adaptive sampling methodology for structural identification using radial-basis functions*, Journal of Computing in Civil Engineering **32**(3):04018008. ASCE, 2018.

[5] **A. Costa**, E. Di Buccio, M. Melucci, and G Nannicini, *Efficient Parameter Estimation for Information Retrieval using Black-box Optimization.* IEEE Transactions on Knowledge and Data Engineering**30**(7):1240-1253. IEEE, 2018.

[6] B. Chai, **A. Costa**, S. Ahipasaoglu, C. Yuen, and Z. Yang, *Optimal meeting scheduling in smart commercial building for energy cost reduction.* IEEE Transactions on Smart Grid **9**(4):3060-3069. IEEE, 2018.

[7] **A. Costa**, T.S. Ng, and L.X. Foo, *Complete mixed integer linear programming formulations for modularity density based clustering*, Discrete Optimization **25**:141-158. Elsevier, 2017.

[8] **A. Costa**, S. Kushnarev, L. Liberti, and Z. Sun. *Divisive heuristic for modularity density maximization*, Computers & Operations Research **71**:100-109. Elsevier, 2016.

[9] **A. Costa**, E. Di Buccio, and M. Melucci, *A document retrieval model based on Discrete Fourier Transform*, ACM Transactions on Information Systems **34**(1):6. ACM, 2015.

[10] T. Wortmann, **A. Costa**, G. Nannicini, and T. Schroepfer, *Advantages of surrogate models for architectural design optimization*, Artificial Intelligence for Engineering Design, Analysis and Manufacturing (AIEDAM) **29**(4):471-481. Cambridge University Press, 2015.

[11] **A. Costa**, *MILP formulations for the modularity density maximization problem*, European Journal of Operational Research **245**(1):14–21. Elsevier, 2015.

[12] S. Cafieri, **A. Costa**, and P. Hansen, *Adding cohesion constraints to models for modularity maximization in networks*, Journal of Complex Networks **3**(3):388–410. Oxford University Press, 2015.

[13] S. Cafieri, **A. Costa**, and P. Hansen, *Reformulation of a model for hierarchical divisive graph modularity maximization*, Annals of Operations Research **222**(1):213–226. Special Issue "ORP3-OR for Young Researchers and Practitioners". Springer, 2014.

[14] **A. Costa** and P. Hansen, *A locally optimal hierarchical divisive heuristic for bipartite modularity maximization*, Optimization Letters **8**(3):903–917. Springer, 2014.

[15] **A. Costa**, *Valid constraints for the Point Packing in a Square problem*, Discrete Applied Mathematics **161**(18):2901–2909. Elsevier, 2013.

[16] **A. Costa**, *Applications of reformulations in mathematical programming*, Ph.D. thesis abstract, 4OR **11**(3):295–296. Springer, 2013.

[17] **A. Costa**, P. Hansen, and L. Liberti, *On the impact of symmetry-breaking constraints on spatial Branch-and-Bound for circle packing in a square*, Discrete Applied Mathematics **161**(1-2):96–106. Elsevier, 2013.

[18] S. Cafieri, G. Caporossi, P. Hansen, S. Perron, and **A. Costa**, *Finding communities in networks in the strong and almost-strong sense*, Physical Review E **85**(4):046113. American Physical Society, 2012.

[19] **A. Costa** and P. Hansen, *Comment on "Evolutionary method for finding communities in bipartite networks"*, Physical Review E **84**(5):058101. American Physical Society, 2011.

CONFERENCES (REFEREED)

[20] **A. Costa**, M. Proverbio, and I.F.C. Smith, *Cyber Civil Infrastructure and IoT for Cities*, SSCI 2017 Proceedings, 2140–2147, Hawaii, U.S.A. IEEE, 2017.

[21] **A. Costa**, G. Nannicini, T. Schroepfer, and T. Wortmann, *Black-box optimization of lighting simulation in architectural design*, CSD&M Asia 2014 Proceedings, 27–39, Singapore. Springer, 2015.

[22] B. Chai, **A. Costa**, S. Ahipasaoglu, S. Huang, C. Yuen, and Z. Yang, *Minimizing Commercial Building Cost in Smart Grid: An Optimal Meeting Scheduling Approach*, IEEE SmartGridComm 2014 Proceedings, 764–769, Venice, Italy. Springer, 2014.

[23] F. Roda and **A. Costa**, *Bipartite Modularity based clustering for Collaborative Filtering*, in A. Brieden, K. Görgülü, T. Krug, E. Kropat, S. Meyer-Nieberg, G. Mihelcic, S. Wolfgang Pickl (Eds.), CTW 2012 Proceedings, 224-227, Munich, Germany, 2012.

[24] **A. Costa** and L. Liberti, *Relaxations of multilinear convex envelopes: dual is better than primal*, SEA 2012 Proceedings, Lecture Notes in Computer Science **7276**:87–98. Springer, Heidelberg, 2012.

[25] **A. Costa**, S. Cafieri, and P. Hansen, *Reformulation of a locally optimal heuristic for modularity maximization*, ROADEF 2012 Proceedings, 150–153, Angers, France, 2012.

[26] **A. Costa** and L. Liberti, *Convex envelopes of multilinear terms: the dual approach*, ROADEF 2012 Proceedings, 154–155, Angers, France, 2012.

[27] **A. Costa** and I. Tseveendorj, *Symmetry breaking constraints for the problem of Packing Equal Circles in a Square*, in C. Luz, F. Valente (Eds.), ICORES 2012 Proceedings, 5–10, Vilamoura-Algarve, Portugal, 2012.

[28] F. Roda, **A. Costa**, and L. Liberti, *Applications of Systems Architecture concepts*, CSDM 2011 Proceedings, Paris, 2011.

[29] **A. Costa**, P. Hansen and L. Liberti, *Bound constraints for Point Packing in a Square*, in L. Adacher, M. Flamini, G. Leo, G. Nicosia, A. Pacifici, V. Piccialli (Eds.), CTW 2011 Proceedings, 126–129, Frascati, Italy, 2011.

[30] **A. Costa** and F. Roda, *Recommender Systems by means of Information Retrieval*, WIMS 2011 Proceedings, **57**:1–5, Sogndal, Norway. ACM, 2011.

[31] F. Roda, **A. Costa**, and L. Liberti, *Optimal Recommender Systems Blending*, WIMS 2011 Proceedings, **60**:1–3, Sogndal, Norway. ACM, 2011.

[32] **A. Costa**, P. Hansen, and L. Liberti, *Symmetry breaking constraints for the circle packing in a square problem*, ROADEF 2011 Proceedings, vol. 1, 63–64, Saint-Etienne, France, 2011.

[33] **A. Costa**, *Optimization algorithm for improving the efficacy of an information retrieval model*, in S. Cafieri, B. G.-Toth, L. Liberti, F. Messine (Eds.), TOGO 2010 Proceedings, 35–38, Toulouse, France, 2010.

[34] **A. Costa**, P. Hansen, and L. Liberti, *Static symmetry breaking in circle packing*, in U. Faigle, R. Schrader, D. Herrmann (Eds.), CTW 2010 Proceedings, 47–50, Köln, Germany, 2010.

[35] **A. Costa** and M. Melucci, *An information retrieval model based on Discrete Fourier Transform*, in H. Cunningham, A. Hanbury, and S. Rüger (Eds.), IRFC 2010 Proceedings, Lecture Notes in Computer Science **6107**:84–99. Springer, Heidelberg, 2010.

[36] **A. Costa**, L. Liberti, and P. Hansen, *Formulation symmetries in circle packing*, in P. Bonami, L. Liberti, A.J. Miller, A. Sartenaer (Eds.), EWMINLP 2010 Proceedings, 219–221, Marseille, France, 2010.

[37] **A. Costa**, P. Hansen, and L. Liberti, *Formulation symmetries in circle packing*, in M. Haouari, A.R. Mahjoub (Eds.), ISCO 2010 Proceedings, Electronic Notes in Discrete Mathematics **36**:1303–1310. Elsevier, 2010.

OTHER

[38] **A. Costa**, *Some remarks on modularity density*, Technical Report, arXiv:1409.4063, 2014.

[39] **A. Costa**, *Applications of Reformulations in Mathematical Programming*, Ph.D. Thesis, École Polytechnique, 2012.

[40] **A. Costa**, *Solution for the problem of the game heads or tails*, Technical Report, arXiv:1012.0508, 2010.

[41] **A. Costa**, *Detecting and breaking symmetries in circle packing*, Oberwolfach Reports **7**(3):2277–2279. European Mathematical Society, 2010.

Conferences with Contribution

- **SSCI17** (*IEEE Symposium Series on Computational Intelligence*), Hawaii, U.S.A., 12/2017.

- **INFORMS16** (*INFORMS annual meeting*), Nashville, U.S.A., 11/2016.

- **CSD&M Asia14** (*1st Asia-Pacific Conference on Complex Systems Design & Management*), Singapore, 12/2014.

- **EURO13** (*26th European Conference on Operational Research*), Rome, Italy, 07/2013.

- **SEA12** (*11th International Symposium on Experimental Algorithms*), Bordeaux, France, 06/2012.

- **ROADEF12** (*13th annual congress of the French Operations Research Society*), Angers, France, 04/2012.

- **ICORES12** (*1st International Conference on Operations Research and Enterprise Systems*), Vialmoura-Algarve, Portugal, 02/2012.

- **CTW11** (*10th Cologne Twente Workshop on Graphs and Combinatorial Optimization*), Frascati, Italy, 06/2011.

- **WIMS11** (*International Conference on Web Intelligence, Mining and Semantics*), Sogndal, Norway, 05/2011.

- **ROADEF11** (*12th annual congress of the French Operations Research Society*), Saint-Etienne, France, 03/2011.

- **TOGO10** (*Toulouse Global Optimization*), Toulouse, France, 08-09/2010.

- **Exploiting Symmetry in Optimization** (*Oberwolfach Mini-Workshop 1034c*), Oberwolfach, Germany, 08/2010.

- **IRFC10** (*1st Information Retrieval Facility Conference*), Vienna, Austria, 05/2010.

- **CTW10** (*9th Cologne Twente Workshop on Graphs and Combinatorial Optimization*), Köln, Germany, 05/2010.

- **EWMINLP10** (*European Workshop on Mixed Integer Nonlinear Programming*), Marseille, France, 04/2010.

- **ISCO10** (*International Symposium on Combinatorial Optimization*), Hammamet, Tunisia, 03/2010.

Organization Activities

- Session Chair, *WB38 - Opt. Robust*, INFORMS annual meeting, Nashville, November 2016.

- Programme Committee member for the 8th Asia Information Retrieval Societies (AIRS) conference, Tianjin, China, December 2012.

- Local organization tasks for *Pretty Structures* workshop, Paris, May 2011.

- **Reviewer for international journals:** *Discrete Applied Mathematics, Computers & Operations Research, Physica A, Physics Letters A, European Journal of Operational Research, Optimization Letters, International Transactions in Operational Research.*

Teaching Experience

Course taught

Fall 2016	Operations Research 1 (IE2110), 8 hours. NUS. Course level: undergraduate.
Spring 2013	Modeling the Systems World (10.007), 48 hours. SUTD. Course level: undergraduate.

Supervision and tutoring

- **2016-2017**: Co-supervison (with T.S. Ng) of the final year project of Shen Yee (NUS ISE).

- **2015-2016**: Co-supervison (with T.S. Ng) of the final year project of Lin Xuan Foo (NUS ISE).

- **2015**: Co-supervison (with S. Kushnarev) of the summer project of Zeyu Sun (SUTD).

Invited Talks, Seminars, and Visiting Terms

- **10/2014**: seminar on "multilinear optimization". IBM Singapore, invited by L. Wynter.

- **06/2014**: seminar on "black-box optimization". IBM Singapore, invited by L. Wynter.

- **06/2013**: seminar on "black-box optimization". École Polytechnique, invited by C. D'Ambrosio.

- **10-12/2011**: research on "clustering methods". GERAD, HEC Montréal, invited by P. Hansen.

Professional Activities

2016-2017 **Member of INFORMS.**

2010-2015 **Scientific Collaborator, Information Management System (IMS) group**,
Department of Information Engineering, Università degli studi di Padova, Italy.

2011-2012 **Substitute representative of Ph.D. students at the laboratory board**,
LIX, École Polytechnique, France.

2009-2012 **Member of "Société française de Recherche Opérationnelle et Aide
à la Décision" (ROADEF)**, French Operations Research Society.

Languages

- **Italian:** mother tongue, **English/French:** fluent, **Mandarin/Spanish:** beginner.