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1 Current position and experience

November 2016- | Postdoctoral research associate in Optimization
Wisconsin Institute for Discovery
University of Wisconsin-Madison
Madison, WI, USA
Supervisor: Stephen J. Wright.

1.1 Positions and internships

October 2013-October 2016 | Doctoral researcher in Applied Mathematics
Institut de Recherche en Informatique de Toulouse (IRIT)
Toulouse, France

October 2013-September 2016 | Teaching assistant under doctoral grant
École Nationale Supérieure d'Électrotechnique, d'Électronique,
d'Informatique, d'Hydraulique et des Télécommunications
(ENSEEIH)
Toulouse, France

February-April 2016 | Visiting scholar (*Thesis Parts Appointment*)
Argonne National Laboratory
Lemont, IL, USA
Supervised by Stefan Wild and Jeffrey Larson

March-September 2013 | Stochastic optimization on direct-search methods
Universidade de Coimbra, Coimbra, Portugal
IRIT, Toulouse, France
3rd-year ENSEEIHT internship

January-March 2013 | Improvement of the iterative resolution of
the electromagnetic diffraction calculus with integral equations
Laboratoire PLAsma et Conversion d'Énergie (LAPLACE)
Toulouse, France
3rd-year ENSEEIHT "long project"
Collaboration of Computer Science and Electronics departments

June-August 2012 | Study of the injectivity domain of the prolate ellipsoid
Institut de Mathématiques de Bourgogne, Dijon, France
2nd-year ENSEEIHT internship

2 Publications

2.1 Submitted preprints

1. C. W. Royer and S. J. Wright. Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization. Technical report arXiv:1706.03131, June 2017.
2. S. Gratton, C. W. Royer and L. N. Vicente, A decoupled first/second-order steps technique for nonconvex nonlinear unconstrained optimization with improved complexity bounds. Preprint 17-21, Dept. Mathematics, Univ. Coimbra, 2017.
3. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Direct search based on probabilistic feasible descent for bound and linearly constrained problems. Preprint 17-10, Dept. Mathematics, Univ. Coimbra, 2017.

2.2 International journals

1. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Complexity and global rates of trust-region methods based on probabilistic models. To appear in *IMA Journal of Numerical Analysis*, 2017.
2. S. Gratton, C. W. Royer and L. N. Vicente, A second-order globally convergent direct-search method and its worst-case complexity. *Optimization: A Journal of Mathematical Programming and Operations Research*, 65(6):1105-1128, 2016.
3. S. Gratton, C. W. Royer, L. N. Vicente and Z. Zhang, Direct Search based on Probabilistic Descent. *SIAM Journal on Optimization*, 25(3):1515-1541, 2015.

2.3 Conference proceedings

1. J.-B. Caillaud and C. W. Royer, On the injectivity and nonfocal domains of the ellipsoid of revolution, *Geometric Control Theory and sub-Riemannian Geometry*, 73-86, Springer-Verlag, 2014.

2.4 PhD thesis

1. C. W. Royer, *Derivative-Free Algorithms based on Probabilistic and Deterministic Properties: Complexity Analysis and Numerical Relevance*, University of Toulouse, November 2016.

3 Conference talks

3.1 Invited talks

1. C. W. Royer, *Complexity analysis of second-order line-search algorithms for smooth nonconvex optimization*, Workshop “Beyond convexity: Emerging Challenges in Data Science”, Oaxaca (Mexico), October 2017. Co-author: S. J. Wright. (Invited by the organizers T. Kolda, R. Nowak, R. Willett and S. Wright).
2. C. W. Royer, *Including inexact second-order aspects in first-order methods for nonconvex optimization*, Optimization 2017, Lisbon (Portugal). Co-author: S. J. Wright. (Invited as session organizer by L. N. Vicente.)

3. C. W. Royer, *Direct search based on probabilistic feasible descent for bound and linearly constrained problems*, SIAM Conference on Optimization, Vancouver (Canada), May 2017. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited in the mini-symposia “Derivative-free optimization” chaired by Stefan Wild and Sébastien Le Digabel.)
4. C. W. Royer, *Probabilistic Properties in Derivative-Free and Derivative-Based Optimization Methods*, Séminaire SPOC, Institut de Mathématiques de Bourgogne, Dijon (France), April 2017. (Invited by Alexandre Cabot and Yoann Offret.)
5. C. W. Royer, *Probabilistic Analysis of Derivative-Free Methods*, LANS Seminar, Argonne National Laboratory, Lemont (IL, USA), April 2016. Based on joint works with S. Gratton, L. N. Vicente and Z. Zhang. (Invited by Stefan Wild.)
6. C. W. Royer, *Probabilistic Analysis of Derivative-Free Methods*, WID-DOW Seminar, University of Wisconsin-Madison, Madison (WI, USA), April 2016. Based on joint works with S. Gratton, L. N. Vicente and Z. Zhang. (Invited by Stephen J. Wright.)
7. C. W. Royer, *Direct Search using Probabilistic Descent*, Conference ISMP 2015, Pittsburgh (PA, USA), July 2015. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Zaikun Zhang.)
8. C. W. Royer, *Direct Search using Probabilistic Descent*, Conference Optimization 2014, Guimarães (Portugal). Co-authors: S. Gratton, L. N. Vicente, Z. Zhang. (Invited by Serge Gratton.)

3.2 Contributed talks

1. C. W. Royer, *Numerical Optimization with Complexity Guarantees* (Poster), Autumn School on Optimization in Machine Learning and Data Science, Trier (Germany), August 2017.
2. C. W. Royer, *Complexity analysis of second-order line-search algorithms for smooth non-convex optimization*, MOPTA 2017, Bethlehem (Pennsylvania, USA), August 2017. Co-author: S. J. Wright.
3. C. W. Royer, *Complexity and Global Rates of Optimization Methods based on Probabilistic Properties* (Poster), ACNTW Workshop, Chicago (Illinois, USA), May 2017. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.
4. C. W. Royer, *Probabilistic Feasible Descent Techniques for Derivative-Free Linearly Constrained Optimization*, 14th EUROPT Workshop, Warsaw (Poland), July 2016. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.
5. C. W. Royer, *Second-Order Convergence in Direct-Search Methods*, CIMI Workshop on Optimization with Application to Machine Learning & Data Assimilation, Toulouse, January 2016. Co-authors: S. Gratton, L. N. Vicente.
6. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, Days of the GDR MOA (CNRS), Dijon, France, December 2015. Co-authors: S. Gratton, L. N. Vicente.
7. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, APO PhD students day, Toulouse, November 2015. Co-authors: S. Gratton, L. N. Vicente.

8. C. W. Royer, *Form First to Second-Order Quality Measures in Direct-Search Methods*, 13th EUROPT Workshop, Edinburgh (UK), July 2015. Co-authors: S. Gratton, L. N. Vicente.
9. C. W. Royer, *Direct Search using Probabilistic Descent* (Poster), Workshop *Convex Optimization and Beyond*, Edinburgh (UK), 2014. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.
10. C. W. Royer, *Direct Search using Probabilistic Descent*, APO PhD students day, Toulouse, 2013 and 2014. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.
11. C. W. Royer, *Direct Search using Probabilistic Descent*, International Conference on Continuous Optimization, Lisbon (Portugal), 2013. Co-authors: S. Gratton, L. N. Vicente, Z. Zhang.

4 Awards and Funding

- *Best Poster Award* : delivered during the ALOP Autumn School of Trier University, August 2017.
- *Early Career Travel Award*: delivered by the Society of Industrial and Applied Mathematics (SIAM) to attend the SIAM Conference on Optimization, May 2017.
- *Doctoral fellowship "president quota"*: selective three-year thesis funding from Université Toulouse III Paul Sabatier provided by its presidency.

5 Additional research activities

- Session organizer for the *Optimization 2017* conference in Lisbon, Portugal.
Topics: randomized methods, first-order algorithms with applications.
Invited speakers: G. Garrigos, R. M. Gower, J. Liang, V. Perchet, N. Pustelnik, S. Vaiter.
- Reviewer for journals *Optimization Methods and Software* (2014-), *Optimization Letters* (2016-) and *SIAM Journal on Optimization* (2016-).

6 Teaching activities

From 2013 to 2016, I was a teaching assistant at the French engineering school ENSEEIHT, in the Computer Science and Applied Mathematics (IMA in French) department.

Fall Semesters

2013-2015 Parallel programming with OpenMP (Practical in C)
2013-2015 Numerical Optimization (Practical, Matlab project)
ENSEEIHT, 2nd year IMA

2013-2014 Linear algebra (Practical, Introduction to Matlab)
2015 Hilbertian analysis (Practical, Introduction to Matlab)
2015 Analysis tutorials
ENSEEIHT, 1st year IMA

Spring Semesters

2014-2016 PDE Discretization Techniques (Practical, Matlab project)
2014-2016 Krylov space methods (Practical, Matlab project)
ENSEEIHT, 2nd year IMA

2014-2015 Differential calculus (Tutorials)
ENSEEIHT, 1st year IMA

7 Research education

- August 2017** | Autumn school on Optimization in Machine Learning and Data Science
ALOP Group, Trier Universität, Germany
Three series of lectures with practical sessions:
- Fundamental algorithmic approaches relevant to data analysis
S. Wright (Univ. Wisconsin-Madison, USA)
- Optimization approaches for fitting the canonical tensor decomposition
T. Kolda (Sandia National Labs., USA)
- High performance simplex methods
J. Hall (Univ. Edinburgh, UK)
- September 2015** | Summer school on machine learning and applications
CIMI, University of Toulouse, France
One week course divided in four units:
- Reinforcement Learning
B. Scherrer/A. Lazaric (INRIA, France)
- Optimization methods for machine learning
P. Richtárik (Univ. Edinburgh, UK)
- Information Retrieval
M. Melucci (Univ. Padua, Italy)
- Dictionary Learning
J. Mairal (INRIA, France)
Two workshops on Optimization for Machine Learning and Sequential Learning.
- May 2015** | Course on numerical optimization and applications
XLIM, University of Limoges, France
Three short doctoral courses:
- Bundle methods for nonsmooth optimization
D. Noll, (IMT, France)
- Complementarity problems and applications
M. Haddou (INSA Rennes, France)
- Nonsmooth, nonconvex optimization
M. Overton (Courant Institute, NY, USA)
- December 2014** | Introduction to probabilistic constraints
Institute of Mathematics of Toulouse, France
Seminar and short course
Lecturer: René Henrion (Weierstrass Institute, Germany)
- June 2014** | NATCOR Convex Optimization Course
The University of Edinburgh, Edinburgh, UK
PhD Student Course
Main lecturers: J. Hall, J. Gondzio, P. Richtárik.
- April 2014** | Uncertainty Quantification : Theory and Applications to Algorithms, Computational Fluid Dynamics and Geosciences
CERFACS, Toulouse, France
CERFACS training course
Lecturers: P. Sagaut, P. Congedo, V. Mallet.

July 2013	PDE-Constrained Optimization Sparse Optimization and Applications to Image Processing <i>Universidade Nova de Lisboa, Lisbon, Portugal</i> Summer schools of the conference ICCOPT 2013 Lecturers: S. Wright, M. Figueiredo, C. Meyer, M. Ulbrich.
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8 Education

2013-2016	PhD in applied mathematics Topic: <i>Probabilistic properties and complexity analysis in derivative-free optimization</i> Supervisors: Serge Gratton (Univ. Toulouse) and Luis Nunes Vicente (Univ. Coimbra, Portugal) <i>Defended on November 4, 2016.</i> IRIT (Institute for Research in Computer Science of Toulouse) Toulouse, France
2012-2013	Master Degree in Computer Science <i>Minor: Distributed Systems and Critical Software</i> INPT (National Polytechnical Institute of Toulouse) Toulouse, France
2010-2013	Engineer Degree in Computer Science and Applied Mathematics <i>Department: Computer Science and Applied Mathematics (IMA)</i> <i>Minor: Applied Mathematics</i> ENSEEIHT (National Engineering School of Electrotechnics, Electronics, Computer Science, Hydraulics and Telecommunications) Toulouse, France

9 Programming skills

Imperative programming	C, Fortran
Object-oriented programming	Java, C++
Functional programming	CamL
Mathematical computations	Matlab, R, Maple

10 Languages

French Native speaker

English Fluent speaker

Portuguese Intermediate level, good written understanding

Spanish Scholar, basics in understanding and communication