The Gaspard Monge Program for Optimisation and operational research

2016 Review

PGMO Days 2016
November 8, 2016

Sandrine Charousset
Stéphane Gaubert
Gilles Stoltz

Research Projects

PGMO call for projects

Topics

- Research Projects (Optimisation)
- Teaching projects

3 kinds of projects

A : trainees, material, trips, invitations ...

B : PHD, post-doc, invited researchers

Open to all academic teams

C : Invited professor

- In Saclay laboratories

Criterias for elected projects

- Scientific quality at the highest international level
- Cooperation and networking between different teams
- Projects organising seminars and workshops in Saclay,
- Projects with young researchers,
- Applications to industry

Next call for projects

- Schedule to be announced due to renewal of PGMO
- **New :**
  - **PRMO Call for projects**
    - Labex Funding – Paris Saclay
    - Industrial Patronage Funding – no geographical criteria
  - **IROE**
    - Icode Funding – Paris Saclay
    - Industrial Patronage Funding – no geographical criteria
    - Call for projects
      - ✓ Classical projects (A) e.g. internships, travelling…..
      - ✓ Postdoc program on specific topics
  - **IRSDI**

2012-2016 Projects

~80 projects

- 2012 : 21 projects (7 PRMO, 14 IROE)
- 2013 : 14 new projects (10 PRMO, 4 IROE) +14 ongoing projects
- 2014 : 17 new projects (13 PRMO, 4 IROE) + 20 ongoing projects
- 2015 : 26 new projects (18 PRMO, 8 IROE) + 11 ongoing projects
- 2016 : 30 new projects (13 PRMO, 8 IROE, 9 IRSDI) + 17 ongoing projects

PRMO Projects

A wide range of different optimization techniques

Stochastic

- Adjustable robust optimisation applied to network design problems (M. Poss, montpellier)
- Latin America Stochastic Optimization Network (LASON) (B. Pagnoncelli, Santiago Chili)
- Generalized framework for robust approximated approach to chance-constrained optimization problems (D. Nace, UTC)
- Paris-London network on stochastics and optimization in renewable energy (T. Pennanen, King's College)
- Combinatorial optimization/Optimization and uncertainties (R. Figuereido, Avignon)

- **Stochastic Optimization for Planning Remanufacturing Activities in Reverse Supply Chains (C. Gicquel, Paris Sud)- funded by LMH Labex**

Combinatorial Optimization

- Combinatorial Optimization with Multiple Resources and Energy Contraints (S. Ngueveu, LAAS)
- QPLIB2014: a Library of Quadratic Programming Instances (F. Furini, Paris Dauphine)
- Global solution of mixed-integer polynomial optimization problems through quadratic reformulation (A. Lambert, Evry)
- BENMIP:A Generic Bender Decomposition -based (Mixed) Integer Programming Solver (S. Gelareh, Lille)

- Connexions Optimales, Calcul et Approximations (A. Lemenant, Paris Diderot)
- Fast relaxations of the optimal power flow problem (L Liberti, Polytechnique)
- Stability versus Optimality in Dynamic Environment Agorithmics (B. Escoffier, Paris 6)
- Exact and approximation algorithms for fair assignment/matching problems (VH Nguyen, Paris 6)
- Efficient exact algorithms for Graph Partitioning Problems 3nd year (EEAGPP3) (R. Mahjoub, Paris Dauphine)
- Partitionnement connexe équicoloré des Smartgrids (R Grappe, Paris Nord)
- Effective algorithms for generic quadratic problems using QPLIB2014 (F. Furini, Paris Dauphine)

Games

- NOUGAT – Non-Unique Optimization and Game Theory (V. Perchet, Ensae)
- LMG – Limit game: asymptotic analysis of two person zero-sum dynamic games (G. Vigeral, Paris Dauphine)
- COGLED– Convergence of gradient-like and evolutionary dynamics (S. Sorin, Paris Dauphine)
- Stochastic Revision Games (SRG) (T. Tomala, HEC)
- Search and Surveillance Games: Theory, Algorithms and Applications (S. Angelopoulos, Paris 6)
- Strategic design optimization problem under stochastic user equilibrium constraints (Y. Hayel, Avignon)

- Variational and PDE methods in Mean Field Games (VarPDEMFG) (D. Tonon, Paris Dauphine)

Control and calculus of variations

- PASTOR : perturbation analysis for deterministic and stochastic optimal control problems (F. Silva, Limoges)
- Optimal control of partial differential equations using parameterizing manifolds, model reduction, and dynamic programming (A. Kroener, Ecole Polytechnique) – cofunded by PGMO and LMH Labex
- Robust optimization for control (D. Noll, Toulouse)
- Geometric Optimal Control (L. Rizzi, Polytechnique) – cofunded by PGMO and LMH Labex
- Stochastic Control under State Constraints and Maximum Principle (P. Bettiol, Brest)

- Averaging for optimal control and applications in space mechanics (JB caillau, CNRS INRIA)

Black-Box

- Towards a Complexity Theory for Black Box Optimization (C. Doerr, Paris 6)

- Parameter Optimization via Drift Analysis (PODA) (C. Doerr, Paris 6) – funded by LMH Labex

Applications of Optimization

- How Randomness Helps in Scheduling Problems (F. Pascual, Paris 6)
- Optimisation sous contraintes de fiabilité de systèmes complexes – Application à l'ancrage des supports d'éolienne flottante (J. Garnier, Parie Diderot)
- Stochastic Optimization for Planning Remanufacturing Activities in Reverse Supply Chains (C. Gicquel, Paris Sud)
- Solar Forecasting with Epi-Splines (V. Leclere, ENPC)

- Optimizing energy allocation using lot sizing models (OPAL) (S. Ngueveu, Toulouse)

Numerical Optimization : Large scale or Global

- Covering Balls Techniques (COBALT) for nonconvex optimization (Y. Tseevendorj, UVSQ)
- Sparse variational classification by proximal splitting (P. Combettes, Paris 6)

- From monotone operators to smoothed duality gap (O. fercoq, Telecom) – funded by LMH Labex

Optimization, Statistics and Games

- Active Learning, Links with Optimization (N. Vayatis, Cachan)

- Statistical inverse problems by convex optimization (A. Iouditsky, Grenoble)
- BAndits with Structure and Sparsity (V. Perchet, ENSAE) – funded by LMH Labex

IRSDI Projects

IRSDI projects by company

With EDF or Enedis

- Jairo Cugliari / Disaggregated electricity forecasting using clustering of individual consumers
- Julien Jacques / Model--based functional co--clustering for the analysis and the prediction of electric power consumption
- Themis Palpanas / Time series analysis for predictive maintenance
- Albert Bifet / ERDF Linky electricity forecasts Using machine learning in real time
- Eric Matzner-Lober / Projet de prévision des localisations des incidents sur le réseau de moyenne tension de distribution d'électricité à Paris

With other companies

- Criteo & Vianney Perchet / Temporal correlations in learning and retargetting
- Mediamobile & Jean-Michel Loubes / Database for road traffic description
- Amadeus & Philippe Michelon / Estimation du trafic aérien mondial
- Metigate & Mireille Bossy / Séries temporelles et régime météorologique régionalisé

IROE Projects

Energy Management Traditionnal Problems

- Scheduling Outages for nuclear plants
  - Optimization of the scheduling of the Nuclear Power Plant stops (R. Wolfler, Paris Nord)
  - Dantzig-Wolfe and Benders decompositions applied to the problem of the scheduling of the Nuclear Power Plant stops with uncertainties (F. van der Beck, INRIA Bordeaux)
- Long-Term / investments
  - Proximal decomposition of Stochastic Zonal Long-Term Energy Production Planning (P. Mahey, Clermont-Ferrand)
- Generic tools
  - Advanced Modeling Tools for Decomposition Methods Applied to Energy Optimization Problems (A. Frangioni, Pise)

Energy Management Traditionnal Problems

- Short terme Optimization of electricity Generation Schedules
  - Stochastic Optimization for Unit-Commitment problems (M. Minoux / R. Henrion, Berlin)
  - Consistent Dual Signals and Optimal Primal Solutions (A. Frangioni, Pise)
  - Making time-series constraints more robust and more widely accessible and using them for short term unit rescheduling (N. Beldiceanu, Nantes)
  - Learning4opt (E. Rachelson, Supaero)
  - Optimization & stability of stochastic unit-commitment problems (M. Théra, Limoges)
  - Resource constrained shortest path algorithms for EDF short-term thermal production planning problem. (A. Parmentier, ENPC)
  - Shortest Path Problem variants for the Hydro Unit Commitment Problem (C. d'Ambrosio, Polytechnique)

Energy Management new Problems

- Design and Pricing of Electricity Services in a Competitive Environment (L. Brotcorne)
- « Cabling » optimisation for Smart-Grids (MC. Costa, Ensta)
- Centralized versus Decentralized Energy Management in a Stochastic Setting (B. Pagnoncelli, Chili)
- Decentralized control for renewable integration in smart-grids (A. Busic, Mines Paris)
- Smart Methods for the Grid (P. Carpentier, ENSTA)
- Decentralised optimization and smart-grids (E. G. Talbi, Lille)

- Multi-leader-follower approach for energy pricing problems: competitive interactions producers/aggregators and producers/smart grid operators (D. Aussel, perpignan)
- OGRE (optimization, Games and renewable energy) (M de Lara, ENPC)
- Smart Cities with Efficient Coupled Energy-Transport Management (Y Hayel, Avignon)

Other fields of Energy

- Optimization of the vehicle routing problem with electric vehicles (C. Gueret)
- Optimisation sous contraintes de fiabilité de sustèmes complexes : application à l'ancrage des supports d'éolienne flottante (J. Garnier, Paris Diderot)

- Simulation-Optimization applied to Engineering Asset Management (J. Mc Call, Robert Gordon Univ.)
- NumBER - Numerical Black-box Optimization for Energy Applications (A. Auger, Inria)
- Méthodes tropicales pour l'analyse de performance de systèmes temporisé, application au dimensionnement d'un centre d'appel EDF (X. Allamigeon, INRIA)