Salvador Flores

Curriculum Vitae

Research Engineer, PhD.
Centro de Modelamiento Matemático
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Personal Information

Full name	: Salvador Alejandro Flores Martínez
Passport number	: 13.776.558-6
Birth Date	: July 8, 1980
Nationality	: Chilean

Languages spoken

English : Fluent
French : Native fluency
Spanish: First language

Education

Professional Degree

2005 **Mathematical Engineer**.
Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.

Academic degrees

2011 ***PhD.* in Applied Mathematics**.
Université Toulouse III Paul Sabatier, Toulouse, France.

2007 ***MSc.* Modelling, information and systems sciences**
Université Toulouse III Paul Sabatier, Toulouse, France.

2005 ***BSc.* Engineering sciences**.
Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.

Research and development specialization areas

- Data Analysis: data mining and machine learning algorithms, robust statistics, linear and nonlinear estimation.

- Optimization: large scale optimization, numerical optimization algorithms, stochastic programming.

Consulting

- Resource-constrained scheduling model for airplanes maintenance at LAN (2004).
- Batch scheduling model for the leading packaging company in Chile (2005).

PhD. Thesis

Title	:	Global Optimization Problems in Robust Statistics
Resume	:	Robust statistics is a branch of statistics dealing with the analysis of data containing contaminated observations. Robust estimators are often defined as global minima of difficult optimization problems. The dissertation investigates the contributions of modern global optimization methods to this class of problems.

Academic Positions

2011–2014	**Postdoctoral researcher** at Center for Mathematics Modelling, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile.
2010–2011	**Temporary Adjoint for Teaching and Research** at Toulouse 1 Capitole University (France).

Research

Grants

—**Director** project **Fondecyt Postdoctorate 3120166** *Efficient Algorithms for Robust Data Analysis*. USD $ 100.000; execution: 2011-2014.

Research in public/private partnership

2013-2014	Project *Shock breakout detections with DECam: real–time detection of stellar explosions*. Funded by AURA and CMM.

2012-2014 Project *Development of decision-aid tools for Hydrothermal systems and Microgrids.* Funded by INRIA Chile, Centro de Energía and CMM.

2011-2012 Project *assessment and quantitative control of seismic risk in underground mining.* Funded by FONDAP and CODELCO.

2002-2003 Project *Methodologies for the Integration of Geomecanical information.* Funded by FONDAP and CODELCO.

Research Articles

1.— S. Flores. (2014), *Sharp non-asymptotic performance bounds for ℓ_1 and Huber robust regression estimators.*

2.— S. Flores. (2014), *SOCP relaxation bounds for the optimal subset selection problem applied to robust linear regression.*

3.— S. Flores. (2014), *Does compressed sensing have applications in robust statistics?*

4.— F. Alvarez, S. Flores. (2014), *Existence and approximation for variational problems under uniform constraints on the gradient by power penalty.*

5.— S. Flores. (2010), *On the efficient computation of robust regression estimators.*

6.— F. Alvarez, S. Flores. (2008), *Remarks on Lipschitz solutions to measurable differential inclusions and an existence result for some nonconvex variational problems.*

Participation in international conferences

— 9 talks given in international conferences
— 4 invited seminar talks
— 4 international conferences attended
— 2 international workshops attended

Computing Skills

High performance computing

Experience at user level working CMM Syntagma *cluster* (12 nodes, $\sim$ 100 cores).

Programming languages

- Matlab, expert level. Experience on recursive programming, *mex* extensions (imbedded C code in Matlab), CPlex API for Matlab, SDPT3 and cvxopt solvers for conic optimization problems (machine learning).
- Python, advanced level. Experience in code paralellization, Cython modules (imbedded C code in Python)

- C/ C++, advanced level.
- Java, advanced level.

Statistical and scientific software

- R/S (statistical software).
- Matlab, Octave (scientific computing, matrix calculations).
- CPLEX (linear, integer and quadratic programming). Worked with C, python and Matlab APIs.
- Glpk (linear and integer programming).

Software developed

−*ClusterGO* (Matlab). *Clustering Global Optimization* algorithms with stopping conditions for finding global minima of continuous functions. Also includes an improved method for computing the τ-estimator for robust regression.

−*SOCP-BB* (Matlab/Cplex). branch-and-bound algorithm for choosing an optimal subset of h elements out of n. Focuses on a quadratic objective functions, incorporates SOCP relaxations.

−*LSSO* (R/C/Matlab/Python). *forward-backward* algorithm for solving the class of optimization problems

$$\min_{(g,s)\in\mathbb{R}^p\times\mathbb{R}^n} \sigma\|s\|_1 + \frac{1}{2}\|y - Xg - s\|_2$$

appearing in robust regression and *compressed sensing*. Includes C code though a *MEX* interface for improved performance.

−Elastoplastic Torsion (C++). Solves the non linear PDEs

$$\nabla \cdot (g(x, \nabla u)\nabla u) + \Delta_p u = -f$$

using the finite element method. Handles degenerancy for problems with large p, with applications to power penalty of uniform constraintson the gradient.

SALVADOR FLORES MARTÍNEZ
Santiago, November 13, 2014.
