

Sophie Jacquin

Curriculum Vitae

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Date of birth : 11/11/1989

Education

- 2015 **PhD in Computer Science**, *University of Lille, France*, Ministerial scholarship (MNERT), Research Center in Computer Science, Signal and Automatic Control of Lille (CRISAL).

PhD thesis title: "Hybridization between metaheuristic and dynamic programming for mono and multi-objective optimization problems: Application in energy production".

- Supervisors: El-Ghazali Talbi and Laetitia Jourdan
- Members of the examination board:
 - President: Gilles Goncalves
 - Reviewers: Frédéric Saubion and Patrice Perny
 - Examiners: Lucie Galand and Alexandre Caminada

- 2012 **Master in applied mathematics**, *National Institute of Applied Sciences (INSA)*, Rouen, France.

Master thesis title: "Pattern recognition based on sub-graph isomorphism"

Research activities

- 2012 – 2015 **Hybridization between metaheuristic and dynamic programming for mono and multi-objective optimization problems.**

Brief Synopsis of Research: Due to their size and complexity, a lot of real word optimization problems are very difficult to solve with exact or approximate methods. Some of these problems are also very difficult to solve with metaheuristics. This is due to the high dependencies between the decision variables that make it difficult to explore the space of feasible solutions and cause the deceptiveness of objective functions. During my PhD I proposed and studied a hybrid method between metaheuristics and dynamic programming called DYNAMOP. The main idea of this method is to represent the solutions handled by the metaheuristics as *paths* of the graph of states defined by dynamic programming. The advantage of this representation is that it makes possible to define operators with good properties (locality and heritability), keep many constraints satisfied at all times, and to implement a less costly, iterative evaluation of solutions.

DYNAMOP was tested with success on a hydro-scheduling problem and the unit commitment problem (UCP).

I also proposed an extension of DYNAMOP to multi-objective optimization problems (MO-DYNAMOP). This algorithm is tested on a bi-objective *unit commitment problem*, which is complicated due to its indirect representation. In this case, decoding a genotypic solution involves solving a multi-objective problem. Then, many Pareto-equivalent phenotypic solutions can be generated from a single genotypic solution. We propose and compare 3 decoding strategies to overcome this difficulty. A comparative study indicates that MO-DYNAMOP performs considerably better than many recently published algorithms.

- June – September **Optimisation methods for the hydro scheduling problem.**

- 2012 **Brief Synopsis of Research:** During my master internship I studied simplified versions of the hydro scheduling problem (instances of small size or/and simplified objective function and constraints). To solve these problems I studied and compare different optimization methods, either exact methods or metaheuristics. This work was a preliminary work for my PhD research. The objective was to familiarize myself with the hydro-scheduling problem in order to better understand what makes it difficult and to identify simpler sub-problems that could then be used to define hybridizations.

- October 2011 – May 2012 **Pattern recognition based on sub-graph isomorphism.**
Brief Synopsis of Research: My master project aimed to propose and study some modeling of the sub-graph isomorphism problem in order to define adapted cutting-plane strategies.
- June – September 2010 **Planification of paths with C^n curvature for car-like robots**, *Licence Internship*, Inria, Nancy, France.
Brief Synopsis of Research: During this internship, I dealt with path planing for car-like robots. Usual planners compute paths made of circular arcs, connected by lines segments. The drawback of these paths is that their curvature is not continuous, such that to follow them properly a robot has to stop at each curvature discontinuity. My work was to propose some paths with C^n curvature that could be followed by a car-like robot without important variation of speed.

Teaching activities

- 2015 – 2016 **Temporary teacher and researcher (ATER)**, *University of Lille, France*, (Total 216h).
 - Software engineering: first year master
 - Informatics: first year bachelor (python programming and representation of information)
 - Algorithms: first year bachelor
- 2013 – 2015 **PhD assistant**, *University of Lille*, (Total 116h).
 - Unix tutorial: second year bachelor
 - Monitoring internship: third year bachelor
 - Informatics: first year bachelor (python/oCaml programming and representation of information)
- 2012 – 2013 **Temporary teacher**, *IUT A Lille, France*, (Total 48h).
 - Java programming practical classes: first year bachelor

Supervision

- October 2015 – February 2016 **Master 2 project of Emilie Allart**, *University of Lille*.
Subject: "Metaheuristics for the multi-objective earliness-tardiness scheduling problem".
- October 2014 – February 2015 **End-of-course project of Julien Méthivier and Anthony Scarcia**, *Polytech Lille*.
Subject : "Heuristics for the hydro-scheduling problem".
- February-July 2014 **End-of-course project of Guillaume Pataut**, *Grenoble INP - ENSIMAG*.
Subject : "Design of evolutionary operators for the hydro-scheduling problem".
- January – March 2014 **Master 1 project of Henry Larguet**, *University of Lille*.
Subject : "Uncertain evolutionary algorithm for the unit commitment problem".
- January – March 2014 **Master 1 project of Lucien Mousin**, *University of Lille*.
Subject : "Multi-objective evolutionary algorithm for the unit commitment problem".
- April – July 2013 **Bachelor internship of Yanis Nait Abdelaziz**, *University of Lille*.
Subject : "Evolutionary algorithm for the unit commitment problem".

Administrative activities

- 2016 **Organizing committee member**, *META'16: The 6th International Conference on Metaheuristics and Nature Inspired Computing*, META'2016, Marrakech, Morocco.
- 2015 **Organizing committee member**, *MIC 2015: The Metaheuristics International Conference*, Agadir, Morocco.
- 2014 – 2015 **Student representative position for Research Committee in the Academic Council**, *University of Lille*.

- 2014 **Organizing committee member**, *META'14: The 5th International Conference on Metaheuristics and Nature Inspired Computing*, META'2014, Marrakech, Morocco.

Technical skills

Operating systems	Linux/ Ubuntu / Bash	Languages	C, C++, python, Java, oCaml, Fortran, Lua
Mathematic tools	CPLEX, GLPK, R, Matlab, Maple	Web development	HTML, CSS

Languages

French	Mother tongue	English	Fluent
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Publications

International Refereed Journals

- 2016 **A Multi-objective Dynamic Programming Based Metaheuristic to Solve a Bi-objective Unit Commitment Problem using a Multi-objective Decoder**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
International Journal of Metaheuristics, vol: 5(1): 3-30 (2016)

International Conferences with Proceedings

- 2016 **Decoder-based Evolutionary Algorithm for bi-objective Just-in-Time Single-Machine Job-shop** , *Sophie JACQUIN, Emilie ALLART, Fanny DUFOSSE, Laetitia JOURDAN* .
The 2016 IEEE Symposium Series on Computational Intelligence (IEEE SSCI 2016).
- 2016 **Analysis and Comparison of Multi-objective Evolutionary Approaches on the 1/0 Multi-objective Unit Commitment Problem**, *Saul ZAPOTECAS-MARTINEZ, Sophie JACQUIN, Hernan E. Aguirre and Kiyoshi Tanaka* .
The 2016 IEEE Congress on Evolutionary Computation (IEEE CEC 2016). July 2016.
- 2015 **A multi-objective dynamic programming based metaheuristic**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
The XI Metaheuristic International Conference (MIC 2015).
- 2015 **A Comparison of Decoding Strategies for the 0/1 Multi-objective Unit Commitment Problem**, *Sophie JACQUIN, Lucien MOUSIN, Igor MACHADO, Laetitia JOURDAN, El-Ghazali TALBI* .
8th International Conference on Evolutionary Multi-Criterion Optimization (EMO 2015). *Lecture Notes in Computer Science 9018 pp. 381-395, 2015.*
- 2015 **DYNAMOP Applied to the Unit Commitment Problem**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
9th Learning and Intelligent Optimization Conference (LION 9). *Lecture Notes in Computer Science 8994, pp. 223-228, 2015.*
- 2014 **Dynamic Programming Based Metaheuristic for Energy Planning Problems**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
European Conference on the Applications of Evolutionary Computation (evo* 2014). *Lecture Notes in Computer Science 8602, pp. 165-176, 2014.*

International Conferences

- 2014 **Dynamic Programming Based Metaheuristic for the Unit Commitment Problem**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
The 5th International Conference On Metaheuristics And Nature Inspired Computing (META'14). October 2014. Marrakech, Morocco.

- 2013 **Approximating Dynamic Programing using Metaheuristic for an Energy Problem**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
European Conference on the Applications of Evolutionary Computation (EURO XXVI).
July 2013. Rome, Italy.

[Seminar](#)

- 2015 **Decoding Strategies for the 0/1 Multi-objective Unit Commitment Problem**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
Francilienne day of operational research 2015 (JFRO 2015). September 2015. Paris, France.

[National Conferences](#)

- 2014 **Une métaheuristique basée sur la programmation dynamique pour l'UCP**, *Sophie JACQUIN, Laetitia JOURDAN, El-Ghazali TALBI* .
15th Annual Congress of the French Society of Operations Research and Decision Support (ROADEF 2014). February 2014. Bordeaux, France.

[Hobbies](#)

Circus (hand to hand and aerial dance), drawing and painting