Mathieu Lerouge

PhD student looking for a post-doc in Operations Research

mathieu.lerouge@centralesupelec.fr | +33 6 08 14 62 33

Paris, France | mathieulerouge75 | mathieulerouge.github.io

I am a young researcher with years of education and practical experience in operational research. I am about to finish my PhD which aims at developing user-centered explanations about solutions of Workforce Scheduling and Routing Problems. I am now looking for a post-doc in Operations Research. My research interests include combinatorial optimization, metaheuristics, vehicle routing problems and ethics.

Education

PhD in Operations Research & Explainable Artificial Intelligence

Dec 2020 - present

Laboratoire MICS - Ecole CentraleSupélec - Université Paris Saclay - Gif-sur-Yvette, France

Title: "Designing approaches for generating user-centered explanations about solutions of Workforce Scheduling and Routing Problems"

Directors: Céline Gicquel, Vincent Mousseau, Wassila Ouerdane.

Collaboration with: DecisionBrain and IBM within joint public-private AI project called AIDA.

Abstract: "Combinatorial optimization is used for modeling real-world situations as mathematical problems with well-defined objectives and constraints (*e.g.* workforce management). In order to solve these problems, optimization systems, like solvers or optimization software, are developed by experts. However, usually, the end-users of these systems are not experts in optimization. They often view their systems as black boxes whose reasoning is inaccessible and they may experience trust issues. Thus, we propose to address these issues by designing approaches for generating user-centered explanations about the solutions obtained from optimization systems. More specifically, this work focus on generating explanations in the case of an NP-hard optimization problem: the Workforce Scheduling and Routing Problem. This work is mostly in line with recent concerns about designing explanations for recommendations in autonomous systems. With the recent era of explainable Artificial Intelligence, explanability has gained significant interest."

MS (2nd year) in Operations Research

Sep 2019 - Nov 2020

Conservatoire National des Arts et Métiers - Paris, France

Additional year of MS that I did in order to specialize in Operations Research. Core courses include mathematical programming, metaheuristics, constraint programming, stochastic optimization, graph theory, complexity theory. Supplementary courses in machine learning and reinforcement learning. Did several group and individual projects using Python, Julia, C++, CPLEX, Git, Latex.

"Diplôme d'ingénieur" in Computer Science & Engineering

Sep 2015 - Aug 2019

Ecole Nationale des Ponts et Chaussées - Champs-sur-Marne, France

Three-year curriculum to get a "Diplôme d'ingénieur" (equivalent to a MS of Engineering) in one of the five best "Grandes Ecoles d'ingénieurs" in France. Double major in Computer Science & Structural Engineering. Courses include continuous optimization, introduction to operations research, advanced programming, statistics, introduction to machine learning and computer vision. Did several group and individual projects using Python, C++, Javascript, HTML, Git, Latex.

BA year in Architecture

Sep 2016 - Aug 2017

Ecole d'Architecture de la Ville et des Territoires - Champs-sur-Marne, France

One BA year as part of a double degree program along with the "Diplôme d'ingénieur".

"Classes préparatoires" in Maths, Physics & Computer Science

Sep 2013 - Aug 2015

Lycée Hoche - Versailles, France

Two-year post-secondary curriculum (equivalent to three years of BS) in one of the five best schools preparing students for attending highly challenging contests to join "Grandes Ecoles d'ingénieurs". Courses include pure mathematics (general and linear algebra, mathematical analysis), physics and computer science (graph theory, automata theory, computational complexity) with Python.

Digital skills

Programming languages

Python (Advanced)

Julia (Intermediate)

C++ (Advanced)

Java (Intermediate)

Javascript (Beginner)

HTML (Beginner)

Solvers

Gurobi (Advanced)

CPLEX (Intermediate)

Documenting

Git (Intermediate)

LaTeX (Advanced)

Languages

French (Native)

English (C1-C2)

Spanish (B1-B2)

Portuguese (A2-B1)

Italian (A1)

Soft skills

Curiosity

Adaptability

Autonomy

Initiative

Problem-solving skills

Team-working

Communication

Work experience

Short-term international research visitor
Jun 2023 - Jul 2023

Freie Universität Berlin - Berlin, Germany

Experienced working in another research laboratory, abroad, as part of a one-month visit. Explored research problems at the intersection between the explainability of optimization problems and social vehicle routing problems.

Teaching assistant
Dec 2020 - present

Ecole CentraleSupélec - Université Paris Saclay - Gif-sur-Yvette, France

Taught courses to undergraduate students about algorithmic & complexity and coding group project (involving use of Python and Git) as well as courses to graduate students about operations research & decision aid (invloving use of Python and Gurobi).

Operations Research intern (MS internship)
Jun 2020 - Nov 2020

SNCF Innovation & Recherche - Saint-Denis, France

Addressed the need to develop a method for solving a Dial-A-Ride Problem with time windows, in dynamic and stochastic environment. Reviewed literature about variants of Vehicle Routing Problems. Designed a multiple scenario approach based on local search and implemented it in Java. Wrote a MS thesis.

Architectural Design Optimization intern (MS internship)
Feb 2019 - Aug 2019

Laboratoire Navier - Ecole Nationale des Ponts et Chaussées - Champs-sur-Marne, France

Programmed geometric optimization algorithms using C#. Contributed to a collective scientific paper. Took part in an international conference and contest (IASS 2019). Wrote a MS thesis.

Structural Engineering intern (gap year internship)
Jul 2017 - Jul 2018

Thornton Tomasetti Inc - Washington DC, USA

Modeled and designed building structures for various projects. Programmed tools in Python.

Publications in journals

"**Generating user-centered contrastive explanations for the Workforce Scheduling and Routing Problem**", Mathieu Lerouge, Céline Gicquel, Vincent Mousseau, Wassila Ouerdane, Submitted to EJOR (second revision), 2022.

Conferences with proceedings

Presentation "**Generating counterfactual explanations for the Workforce Scheduling and Routine Problem**", at international conference ICORES, in Lisbon (Portugal), from February 19 to 21, 2023.

Received **Best Paper Award Honorable** for "**Counterfactual Explanations for Workforce Scheduling and Routing Problems**", Mathieu Lerouge, Céline Gicquel, Vincent Mousseau, Wassila Ouerdane, Proceedings of the 12th International Conference on Operations Research and Enterprise Systems (ICORES), 2023.

Conferences without proceedings

Presentation "**Generating explanations of various types for end-users of optimization systems, application to the Workforce Scheduling and Routine Problem**", at French congress ROADEF, in Rennes (France), from February 20 to 23, 2023.

Presentation "**Designing methods for explaning solutions stemming from optimization systems, application to the Workforce Scheduling and Routine Problem**", at French congress ROADEF, in Lyon (France), from February 23 to 25, 2023.

Other presentations

Presentation "**Challenges of designing explanation tools for optimization systems**", at French seminar organized by AFIA on the topic "Trustworthy AI: responsability, robustness, transparency", in Paris (France), October 7, 2021.

References available upon request.

Hobbies

Crafts (drawing, painting)

Cooking (daily practice, classes, contests)

Sports (gymnastics, boxing, climbing)

Dances (salsa, bachata, reggaeton, afro)

Tutoring (volontary work, private lessons)