Marouane FELLOUSSI

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Education

LIMOS Research Laboratory — October 2023 - Present
PhD in Operations Research (supervised by *Xavier Delorme* & *Paolo Gianessi*) — Saint-Étienne, France
- Exact Methods for Energy-Efficient Optimization in Production Systems

French Civil Aviation University — 2019 - 2022
MSc in Aeronautical Engineering — Toulouse, France
- Flight dynamics, air traffic management, aircraft sizing and certification
- Econometrics and forecasting
- Initiation to research

Paul Sabatier University — Fall 2022
Joint degree in Operations Research — Toulouse, France
- Basics in continuous, discrete & stochastic optimization
- Optimization for Machine Learning
- Decision tools for Air Traffic Management

Work Experience

Capgemini Engineering R&D — October 2022 - September 2023
Scientific Software Engineer — Toulouse, France
- Development of an optimized and centralized software for water production plants
  - Development and deployment of a MILP model
  - Code maintenance and continuous integration of new features and business constraints
  - Drafting design documents, organizing customer workshops and on-site installation
  - Improvement of computing performance

Capgemini Engineering R&D — March 2022 - August 2022
Research intern (supervised by *Isabelle Mirouze* & *Sonia Cafieri*) — Toulouse, France
- MILP models for Water Production Scheduling
  - Literature review of the industrial problem
  - Problem formulation in MILP, for each plant and each level of operation
  - Valid inequalities, heuristics, parameter tuning

Labo Aéro - ENAC — Fall 2020 & Summer 2021
Research intern (supervised by *Thierry Klein* & *Nicolas Peteilh*) — Toulouse, France
- Global Sensitivity Analysis for optimized aircraft design
  - Development of sensitivity analysis methods tailored to flight performance simulation libraries
  - Implementation of Sobol' & Cramér-Von-Mises indices with an application to Top-Level Aircraft Requirements.

Skills

Technical Skills	Programming (Python, Julia, C++), GAMS/AMPL, ML-tools, Git
Soft Skills	Curious and analytical mindset Autonomy, dedication, competitiveness
Languages	Bilingual Proficiency : Arabic, English, French

Research Interests

Research	Mixed-Integer-Programming, column generation, polyhedral approaches ML for discrete optimization
Applications	Scheduling and balancing problems Production planning

Projects

Sizing and Optimization of a Long Range Subsonic Aircraft

Producing in detailed dimensions an optimized version of a reference aircraft

Solving the optimal flight path (2D)

MIP, 2-opt, multi-start, a kruksal' inspired algorithm and other heuristics

What makes a song popular?

Analyzing and predicting a song's popularity based on its acoustic features

An AI learns how to fly using Reinforcement Learning

Exploring the usage of RL with an aircraft simulator on Unity

Aerial conflict resolution using a Differential Evolution Algorithm

Study and implementation of a Differential Evolution Algorithm for the worst case

The Steiner Tree Problem: a resolution approach inspired from soap films

Boltzmann statistics and a heuristic inspired from an empirical study