

INTERNATIONAL RELATIONS



INTERNSHIP SUBJECT

2894 - Hybridization of optimization and forecasting methods

Tactical optimization problems aim to provide decision support on a medium-term horizon. In many applications, decisions are made to satisfy a demand that is unknown at this stage. Different strategies can then be applied to face the demand uncertainty. In the simplest case, the average demand over the last periods is considered. This leads to a deterministic optimization problem. A more relevant approach consists in generating a set of scenarios describing the uncertainty in the demand. In this case, a stochastic optimization problem has to be solved. The main challenges are then to design scenarios and to determine how many scenarios to consider. In this internship, we will consider a third strategy. Given that demand on the medium-term horizon can be forecasted using different approaches (time series, neural networks), the objective will be to design and implement an approach that hybridizes the forecasting method with an optimization algorithm.

This approach will be evaluated using real-life data from a city logistics application. Due to the explosion of parcel deliveries, a key issue for carriers is determining the types and number of vehicles required to perform deliveries over a specified period. The number and the locations of parcels to deliver vary according to various factors. In this specific case, forecasting models are used to predict demand while an optimization method determines the fleet composition.

Required Skills

The candidate should have strong skills in Statistics, Machine learning, and Operations Research. More specifically, her/his academic curriculum must include courses on forecasting methods as well as courses on combinatorial optimization. Good programming skills are also required.

General Information

- **Research Theme :** Optimization, machine learning and statistical methods
- **Locality :** Villeneuve d'Ascq
- **Level :** Master
- **Period :** 5th January 2026 -> 31st March 2026 (3 months)

 *These are approximative dates. Please contact the training supervisor to know the precise period.*

- **Deadline to apply :** 1st July 2025 (midnight)

Contacts

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More information

- **Inria Team :** INOCS
- **Inria Center :** Centre Inria de l'Université de Lille