A COOPERATIVE MODEL OF MACHINE LEARNING AND OPERATIONS RESEARCH FOR RAILWAY OPERATIONS
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The platforming problem

- Platforms occupations
- Routing trains through stations

Resolutions

Objectives
- Feasibility
- Preferences
- Robustness

Constraints
- Security
- Infrastructure
- Passenger perspective

Approach
- Definition of incompatible paths affectations for simultaneous trains
- Buffer time allocation
- Mixed Integer Linear Programming Formulation

Limits

- Determinist scheduling
- Sensitive to delays and perturbations
- Need rescheduling in real time operations

ML perspective

- Data available: historic, weather data, speed limitations, holidays,...
- Add of stochasticity in the OR model
- Better understanding of the perturbations
- Improve robustness with conflicts anticipation
- Adaptive setting of preferences and buffer times

Delay Prediction

- Data: all records between 01/07/2016 and 30/04/2017 for high speed trains in commercial service arriving at Montparnasse station (Paris): 23,000 trains
- We want to obtain realistic probability estimation for small delays
- Gamma or Weibull distributions fit if we consider only the positive delays
- Test for Generalized Linear Models with the R package gamlss