



MULTIOBJECTIVE GENETIC DISCOVERY OF DRIVING STRATEGIES

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Problem Description

- Vehicle driving on a route from location A to location B
- Vehicle defined with:
 - engine characteristics
 - transmission characteristics
 - aerodynamic characteristics
 - braking characteristics
 - wheel characteristics
- Route consists of segments
- Segment defined with:
 - length
 - inclination
 - radius
 - velocity limit

Goal

- Find driving strategies regarding two objectives that have to be minimized:
 - traveling time
 - fuel consumption
- Find set of strategies:
 - not worse with respect to both objectives
 - heterogeneous with respect to both objectives

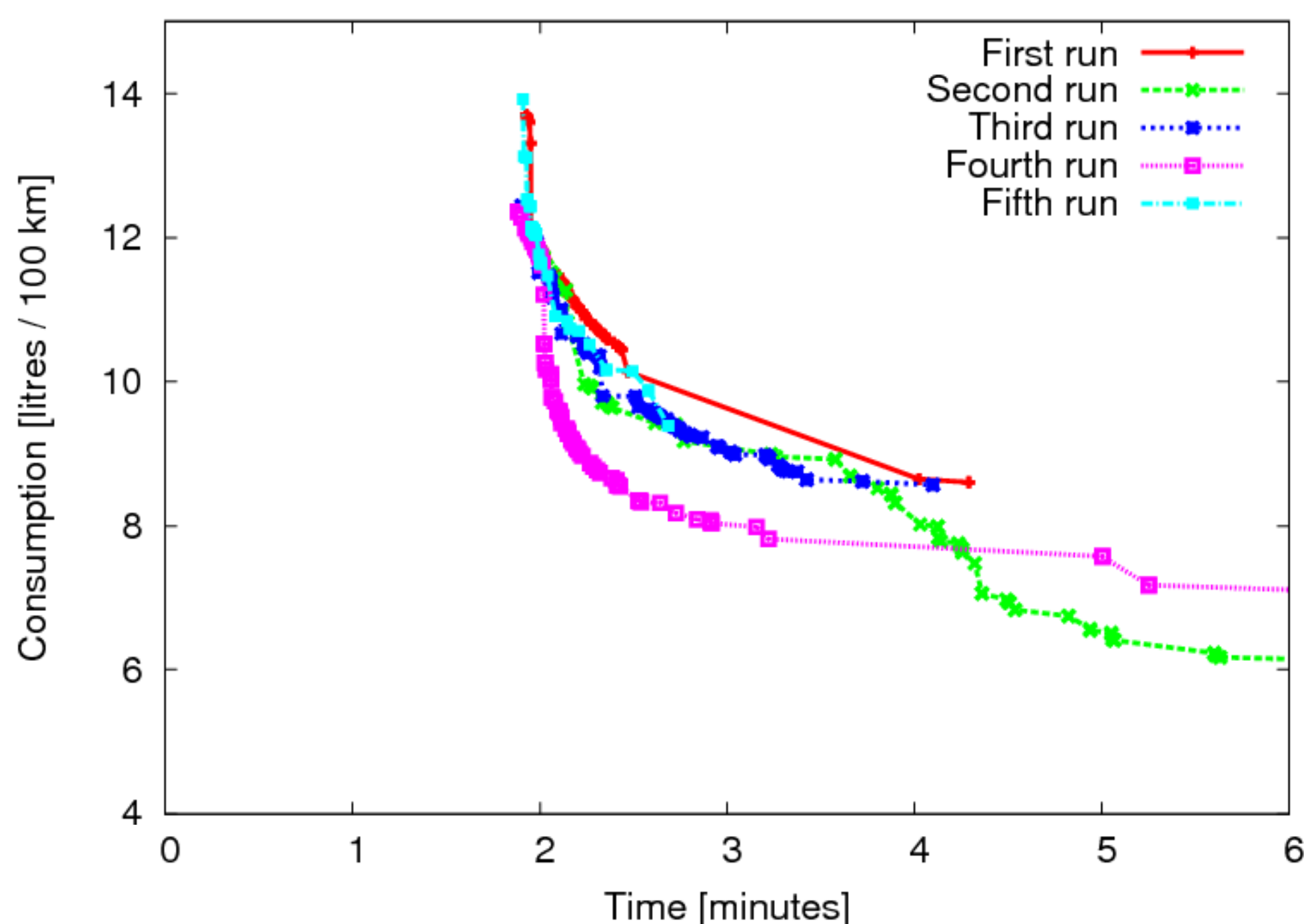
Representation of Driving Strategies

- Strategies as sets of rules
- Rule form:
 - IF vehicle characteristics INSIDE interval1
AND segment characteristics INSIDE interval2
THEN
USE throttle percentage AND gear
OR braking percentage

Solving the Problem

- Find strategies with a multiobjective genetic algorithm based on NSGA-II
- First, random initialization of strategies
- Then, strategy improvement step-by-step, in each step:
 - randomly select two strategies and two rules of these strategies
 - exchange information between the selected rules
 - randomly change the rules
 - delete a randomly selected rule
 - add a randomly created rule
 - evaluate the obtained strategies
 - add these strategies to the set of existing strategies
- Periodically remove the worst and too similar strategies with respect to the objectives

Solutions for a given route found in five experimental runs



Car driving interface

