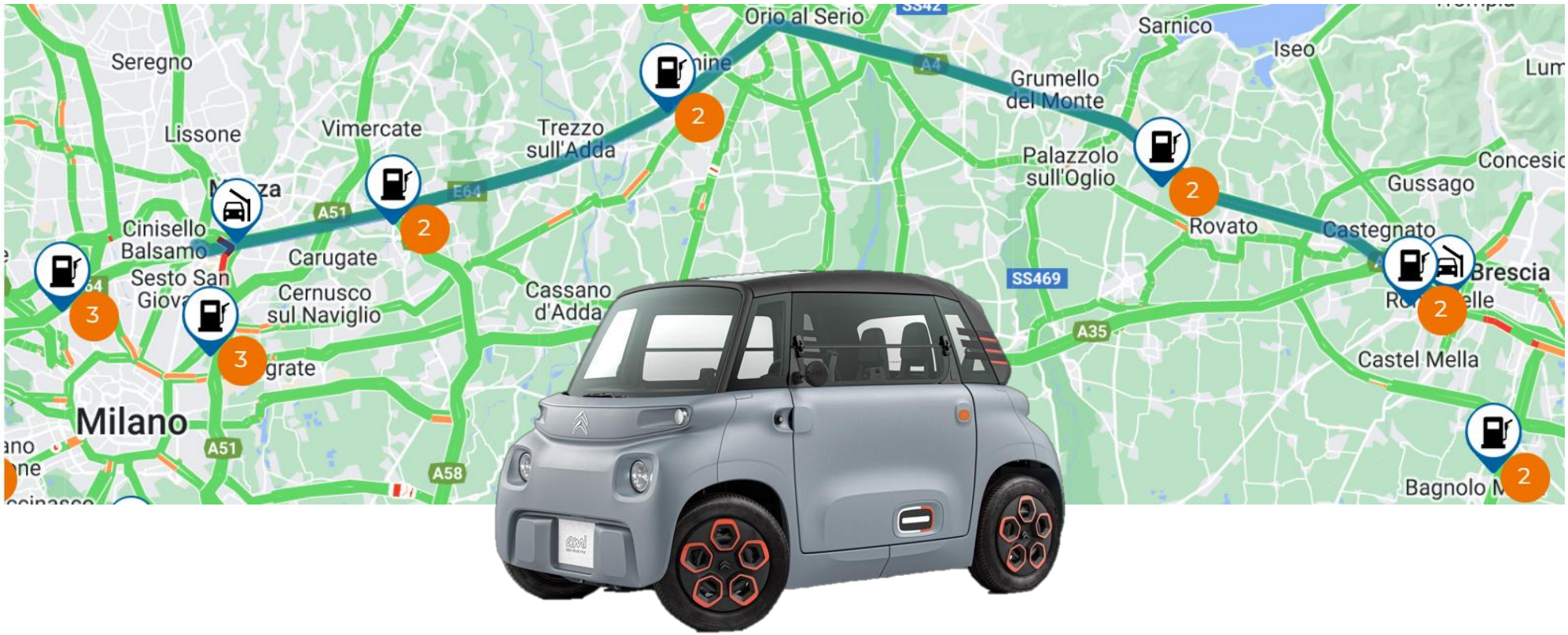
Recharging of an electric car on a highway



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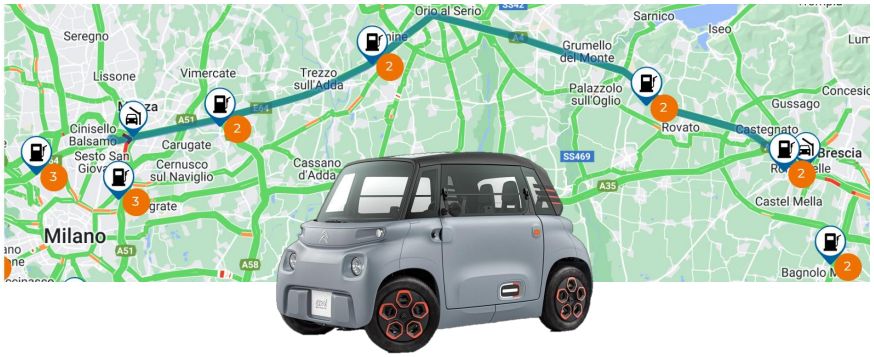
- An electric car has to travel a distance which is slightly longer than the one allowed by its battery capacity: it must stop **exactly once** for recharging on the way!
- There are four road segments on the route, with three charging stations in between: each station has a number of chargers available, and a different loads in number of requests.
- Considering a given probability of choosing exactly one of the charging station, compute the average total travelling time.



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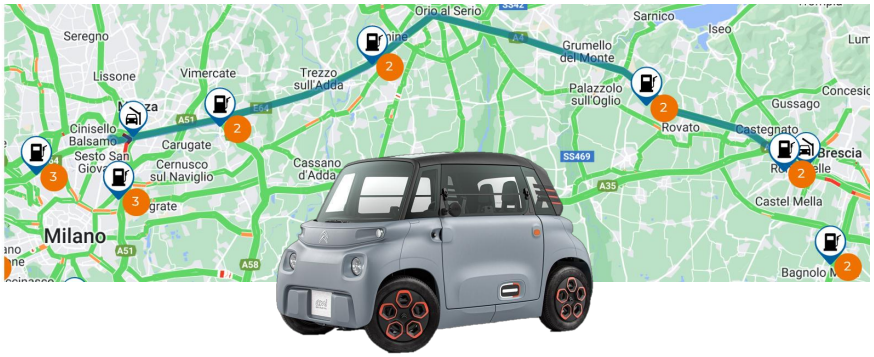
- The travelling times of the four segments, is distributed according to the following traces [all times are expressed in *minutes*]:



Segment	Trace
I	`TraceA-I.txt`
II	`TraceA-II.txt`
III	`TraceA-III.txt`
IV	`TraceA-VI.txt`

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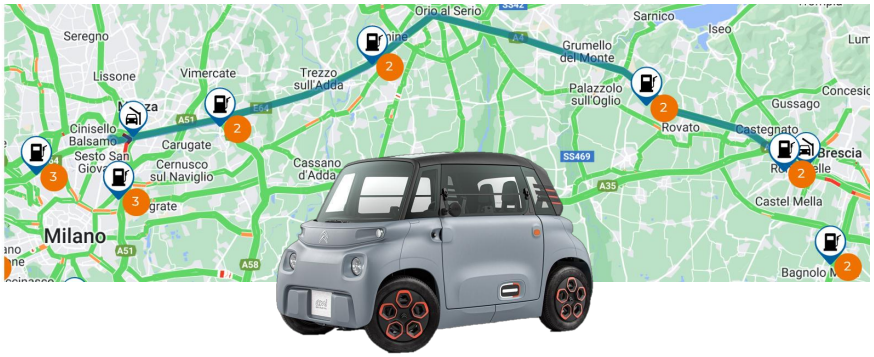
- Charging time are exponentially distributed, according to an exponential distribution, with an average of 30 minutes.
- The request rate by other cars at the station, and the number of chargers, is given in the following table.
- A station is identified by the number of the segments it is between.



Station	Other traffic [car / hour]	Number of chargers
I-II	6	4
II-III	4	3
III-IV	5	3

The arrival rate of other cars at the stations can be considered a Poisson process.

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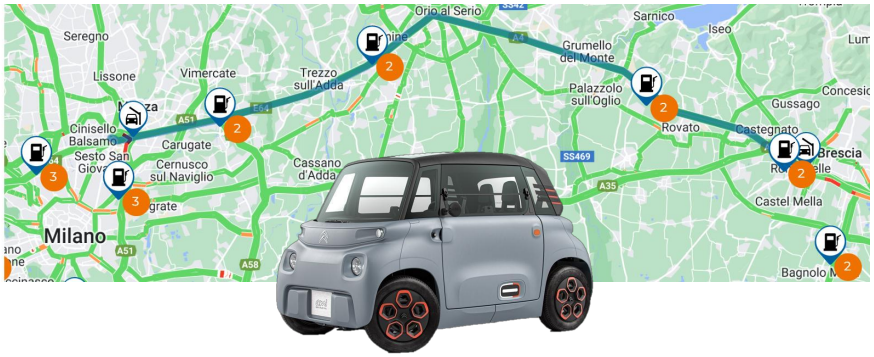

- Determine the *best stopping probability distribution*: test a few alternatives of probabilities of stopping at each station, and for each scenario determine the average travelling time.

- Hint: the motion of the car can be considered as a closed system, with a single job, where the car once it has completed its course, it is teleported back to the initial position to immediately start another trip.
- Other cars competing for the charger, can be seen as an open process.