A Generic Multi-Agent Model for Resource Allocation Strategies in Online On-Demand Transport with Autonomous Vehicles

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<table>
<thead>
<tr>
<th>Metric</th>
<th>Selfish</th>
<th>Dispatching</th>
<th>Auctions</th>
<th>MGM-2</th>
<th>DSA-A (p=0.5)</th>
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<tbody>
<tr>
<td>Load (MB)</td>
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<td>168</td>
<td>21</td>
<td>112</td>
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<tr>
<td>Comm.</td>
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<tr>
<td>Avg</td>
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<td>20</td>
<td>210</td>
<td>25</td>
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</tbody>
</table>

AV-OLRA model

Autonomous Vehicles Online Localized Resource Allocation

A generic model to ODT’s dynamic resource allocation problem in autonomous vehicle fleets with communication constraints

\[ \langle R, V, G, T \rangle \]

- \( R \): a dynamic set of requests
- \( V \): a fleet of \( m \) vehicles
- \( G \): a graph defining the road network
- \( T \): the problem’s time horizon

Solution methods

Depends on the adopted coordination mechanism (CM)

\[ CM := \langle DA, AC, AM \rangle \]

- \( DA \): level of decision autonomy
  - \( C \): centralized
  - \( D \): decentralized
- \( AC \): agents’ cooperativeness level
  - "sharing" (S)
  - "no-sharing" (N)
- \( AM \): the allocation mechanism

Implementation examples

- **Selfish**: \( D, N, \text{Greedy} \) [3]
- **Dispatching**: \( C, S, \text{MILP} \) [2]
- **Auctions**: \( D, S, \text{Auction} \) [1]
- **Cooperative**: \( D, S, \text{DCOP} \)

QoB evolution with the increasing fee size

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>message size</th>
<th>msg per agent</th>
<th>comm. load (MB)</th>
<th>reschedule rate</th>
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References


