Dynamic E-ADARP: Strategies to improve efficiency of the current insertion heuristic

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Characteristics of the Dynamic Electric Autonomous Dial-a-Ride Problem

- Fleet of electric autonomous and capacitated vehicles
- Requests appear in real time
- Transportation network composed of requests nodes, charging stations and depots

- 3 strategies have been developed and intervene in the insertion process between the first two steps -
  They consist in reducing the size of the set of feasible vehicles according to specific metrics

**Strategy 1**
Barycenter of a vehicle

- Charging stations and destination depot
- Departs from a node or insertion of a new request
- Average distance is calculated from feasible vehicles to new request locations
- Stay with a set of vehicles considered to be the closest ones

**Strategy 2**
Flexibility of schedule
Is defined by the average interval of time that a node can be pushed backward or forward within a portion of vehicle schedule

- Calculation of the span of time
- Calculation of the density and the average time slacks for each vehicle
- Stay with a set of vehicles considered to have the most flexible schedules

**Strategy 3**
Combines strategy 1 and 2 in a two-phases approach

- Calculation of metrics from strategy 1 and 2
- Strategy 1
- Strategy 2

General Results

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<tr>
<th>Strategy</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
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<td>27.0</td>
<td>21.9</td>
<td>5.6</td>
<td>-2.7</td>
</tr>
<tr>
<td>2</td>
<td>-19.2</td>
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<tr>
<td>3</td>
<td>27.0</td>
<td>21.9</td>
<td>-0.7</td>
<td>-9.5</td>
</tr>
</tbody>
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Improvement for the acceptance rate

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</tr>
</thead>
<tbody>
<tr>
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<td>-91.3</td>
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</tbody>
</table>

Improvement for the CPU time per insertion