Lehrstuhl für Fahrzeugtechnik
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IDP

Runtime Optimization of a Fleet Algorithm for Heavy Electrified Trucks

To achieve the global climate goals, a change in propulsion is also mandatory in the commercial vehicle industry. However, the hurdles for a transition are still significantly higher than in the private passenger car sector. The financial risks and burdens are difficult for companies to estimate; even with the corresponding willingness, electrifying an entire fleet is only possible with immense effort. For this purpose, the project "SPIRIT-E" was launched, in which solutions for the holistic optimization of the electrification of heavy commercial vehicle fleets are being developed.

To this end, a disposition algorithm has been developed, which is responsible for the cost-optimal assignment of vehicles in a partially electrified truck fleet to predefined trips. This is done under the novelty of bidirectional charging, through which operating costs can be reduced for vehicles that are stationary by offering their battery capacity on the electricity market. This existing disposition algorithm uses a mixed-integer linear program (MILP) implementation to solve the optimization problem. This MILP implementation is now to be optimized in terms of its runtime to increase the practicality of multi-scenario evaluations. The implementation is carried out in Python. The final algorithm and the resulting analyses will be published in an international journal, where your co-authorship is possible given appropriate result quality. The following work packages are to be processed:

WP1: State of the art on the structure and runtime optimization approaches of MILP optimizations.
WP2: Analysis, runtime optimization, and evaluation of the adjustment of the given MILP constraints.
WP3: Analysis, runtime optimization, and evaluation of the adjustment of the given MILP solver parameters.
WP4: Summary of the state of the art, methodology, implementation, and results in a documentation and presentation.

The elaboration should document the individual work steps in a clear form. The processing person undertakes to carry out the work independently and to indicate the scientific aids used. The submitted work remains as examination material in the ownership of the chair. The work can be done in German or English. I look forward to receiving your application with your current transcript.

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