FORWARD: Dataset of a forwarder operating in rough terrain

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ABSTRACT

We present FORWARD, a high-resolution multimodal dataset of a cut-to-length forwarder operating in rough terrain on two harvest sites in the middle part of Sweden. The vehicle is a large Komatsu forwarder equipped with a variety of sensors, such as RTK-GNSS, 360-camera, operator vibration sensors, internal CAN-bus signal recording, and IMU, operating in a forest environment. The data includes the vehicle position with centimeter accuracy, and event time logs recorded in 5 Hz with e.g. driving speed, fuel consumtion, and crane use while the vehicle operates in very high-resolution, 1500 per square meter, laser-scanned forest areas. About 24 hours of regular wood extraction work during three days is annotated from 360-video material into individual work elements. We also include controlled experiments, both on forest roads and in terrain. Experiments are structured and presented in a number of scenarios, ready for incorporation in e.g. simulation workflows. Scenarios include tests w/wo steel tracks, different load weight, and different target speeds. The dataset is intended for developing models and algorithms for trafficability, perception, and autonomous control of forest machines using artificial intelligence, simulation, and experiments on physical testbeds. In part we focus on forwarders traversing terrain, avoiding obstacles, and loading or unloading logs, with consideration for efficiency, safety, and environmental impact. We explore how to auto-generate and calibrate forestry machine simulators and automation scenario descriptions using the data recorded in the field. The data, scripts for data exploration and analysis, and some example analyses will be made publicly available through data and code-sharing repositories.