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Managing Streamed Sensor Data for Mobile Equipment Failure Prediction

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Abstract: The ability to wirelessly stream data from sensors on mobile equipment provides opportunities to assess asset condition proactively.Our streaming data is drawn from a mining industry case study, containing 23M rows (1.8GB) for a single excavator over nine months. This data has 58 numerical sensor variables and 40 binary indicators describing the conditions and status of different subsystems. In addition, data are available from the fleet management and maintenance work order systems. We focus on the hydraulic subsystem, which has 21 potential failure events reported in the period of the data. There are signiffcant issues with the data due to the large volume, inconsistent and asynchronous recording from different sensors, 57% of rows have missing data, and uncertainties in the ground truth for the dependent variable (hydraulic subsystem failure). We demonstrate how the application of an OHLC (Open, High, Low, Close), commonly used in financial analysis, can be used to compress and manage the data. Secondly, we create a data frame of OHLC sensor data, fleet management and maintenance work order data and demonstrate the application of LASSO penalized logistic regression model for variable (sensor/alarm) selection. We found that the variables selected by the data-driven method have similarities when compared to the selection made by experts (asset manager).